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Creating and Managing a Large Department

SIR ANTHONY PART, GCB, MBE

Sir Antony Part was, immediately prior to his retirement in 1976, Permanent Secretary, Department of Industry. Previously he had been Permanent Secretary, Ministry of Public Building and Works from 1965 to 1968, Board of Trade from 1968 to 1970, and Department of Trade and Industry from 1970 to 1974.

—*Editor.*

Introduction

This article is based on my experience with the Ministry of Public Building and Works (MPBW) from 1963 to 1968 and with the Department of Trade and Industry (DTI) from 1970 to 1974. It also includes a lesson from the early days of the Ministry of Supply when I was an Assistant Private Secretary there and saw it grow from a staff of 12 in the spring of 1939 to some 100,000 not much more than a year later.

Large departments can differ considerably from each other: one has only to think of the contrast between, say, the Ministry of Defence, DHSS, the Department of the Environment and Inland Revenue.

Ministry of Public Building and Works

MPBW was responsible for relations with the construction and construction materials industries; but it was mainly a very big executive organization with, in 1964, a staff of some 85,000. Many of them, including 7,000 Chinese, served overseas, and the problems of organization centred partly around the geographical spread, but mainly around the mixture of disciplines (administrators, architects, engineers, surveyors, etc) and the different departmental and professional traditions in which they had been brought up.

There was a world of difference in the attitude of various administrators to professionals and vice versa. The professionals differed considerably among themselves in their attitudes to design and to management of both people and projects. And everyone concerned with building knows that both architects and engineers often find a welcome psychological release in criticizing each other.

The merger of the Ministry of Works and of the works services of the Navy, Army and RAF, at that time separate from each other, was decreed quite suddenly by the then Prime Minister, Mr. Harold Macmillan. It came as an unwelcome shock to many of the civil servants—and indeed the Ministers—concerned. Three months were allowed to

bring the four elements together and another three to plan the effective merger. Meanwhile the massive programme of works had to be carried on without interruption, and on the day when MPBW came into being they received from the Navy Department the formal requirement for the multi-million pound Polaris base in Scotland. The building of this base to time and without any significant increase in cost at constant prices was one of the new Ministry's proudest achievements.

In making MPBW effective the chief needs were speed, decisiveness, the fostering of cohesion, the creation of a common philosophy, the marriage of firm financial control with adequate professional freedom, and the building up of good relations with the Service departments, all of whom resented both the loss of their works services and the fact that financial responsibility was transferred from them to MPBW. At the same time the Post Office was restive about the control of its large building programme.

All this contrasted markedly with the strong and satisfactory tradition built up by the Ministry of Works in its work for the Diplomatic Service and on Ancient Monuments. Much of the credit for this belongs to Sir Edward Muir, my predecessor as Permanent Secretary.

The other major requirements were to create an adequate and efficient regional organization both at home and overseas, and in general to increase the degree of delegation within the Department as a whole. This whole task clearly required a great deal of travelling on the part of top management, and I have MPBW to thank for having been able to visit such places as Hong Kong, Borneo, Malaysia, Sri Lanka, Aden, the Gulf, Gibraltar and the foothills of the Himalayas.

Some of the people who deserved the greatest credit were the wives of the regional staff, who served with marked success and equanimity in unfamiliar surroundings and sometimes in circumstances involving personal danger.

Throughout the organization much depended on the creation of teams of mixed skills: one of the most important needs of departments generally in modern times. To people not used to such teams an organization of this kind can be a strange and difficult experience. This is specially the case when there is professional rivalry or when professionals and administrators have not been accustomed to working closely together. To ease the way the Permanent Secretary must make it clear that he is not going to tolerate any civil wars, however enjoyable they may be. And he and his senior administrators and top professionals must set an example by showing that they themselves can work as a team. This is not always easy, especially as it involves collaboration between professionals of varying backgrounds and temperaments and administrators accustomed to different techniques and traditions to which they are attached.

There was much argument about the relationship between administrators and professionals. The tradition in the Ministry of Works had been that the administrators should be firmly in the lead: there was a

saying popular in those days throughout the Civil Service that the professionals should be 'on tap and not on top'. On the basis of the organization which I had created 15 years earlier in the Ministry of Education to run the post-war school building programme I believed in a parallel partnership, for this seemed to me not only to reflect the real requirement but to be essential to enhance the standing of the professionals. This was the organization adopted in 1964 for MPBW. Unfortunately the Fulton Committee misunderstood both the nature and the purpose of this kind of organization and criticized it with some force as though it were the sort of 'dual hierarchy' practised in some other departments.

The Fulton view in favour of a fully-integrated organization was eventually accepted, and I am afraid that this made it much more difficult to attract into government service young professionals of the highest calibre and promise, a feature which had done so much to help us in the Ministry of Education.

The creation of MPBW, like the creation of all new departments (especially if they are very large), placed a heavy responsibility on the Principal Establishment Officer. As Permanent Secretary I was fortunate in both the holders of this office. They were tough, realistic and energetic, and they each had their own techniques of internal diplomacy, an essential quality in a situation where there was no lack of vigour in controversy.

Much depended too on the leadership of the Staff Side. This was well up to standard, and they held a quite successful balance between fighting their own corners and being prepared to reconcile their internal differences.

I have not mentioned Ministers, for owing to the nature of MPBW they were concerned mainly with policy towards the industries for which the Department was responsible. But so far as organization was concerned Ministers of both parties were invaluable as a sort of court of appeal, and their decisions were quick and authoritative. One Minister gave me as a new Permanent Secretary a particular piece of advice that has stayed in my mind. I was considering promoting to a senior post a man of great experience and some charm, but perhaps without quite the 'cutting edge' required. 'No,' said the Minister, 'I shouldn't do that. Never make a natural lieutenant a captain.' It was a hard lesson to learn, but he was right.

Department of Trade and Industry

The creation of the Department of Trade and Industry represented a very different problem, but it had one feature in common with MPBW. It stemmed from a purely political decision and was not based on any previous preparation in the Civil Service, though I understand that in working out their plans in the late 1960s the Opposition did consult at least one retired Permanent Secretary. This differentiated DTI from the Department of the Environment which had been the subject of a

detailed study by the Civil Service Department and others in Whitehall at the behest of Labour Ministers. We did, however, have about three months to work out the organization between the General Election in June 1970 and October when the Department came into existence.

The main feature of DTI was not its overall size. It was only the seventh largest department. When it came into being in 1970 it had a staff of 25,000 and this was soon to be reduced by the hiving off of 7,000 to form the already planned Civil Aviation Authority. (The concept of hiving off was popular in those days, but the intense struggle of many of those destined for the CAA against losing their status as civil servants helped to bring this particular technique for reducing the size of the Civil Service to a halt: fortunately it did not frustrate the move to further delegation demonstrated in the subsequent creation of such bodies as the Manpower Services Commission.) Of the remaining 18,000 some 7,500 were engaged in providing to industry or the public such services as Export Credits Guarantees, export promotion services, the Patent Office, H.M. Coastguard Service and the Business Statistics Office. Some of these services were able to recoup all or part of their cost by premiums or fees, and their self-contained, largely executive nature made it easier both to delegate authority to them and to develop a local loyalty that was helpful to morale.

During my time we moved the Business Statistics Office from London to the Newport area and we planned the dispersal of the Companies Registration Office. These were successful and sensible moves, organized in close consultation with the Staff Side.

The unique feature of DTI—and one which had caused a number of influential civil servants to argue against its creation—was the wide span of policy responsibilities that it covered. In the interest of unifying the Government's approach to the problems of industry and trade at home and overseas, of aiding our accession to the EEC and of reconciling the traditionally divergent approaches of some of the departments concerned, DTI was to embrace the whole of the Board of Trade, the Ministry of Technology and the Ministry of Fuel and Power, parts of the then Department of Employment and Productivity and, later, parts of the Ministry of Aircraft Supply.

When it was fully fledged in 1973 it had four Second Permanent Secretaries, 18 Deputy Secretaries and some 70 Under-Secretaries. This represented a formidable challenge, not only to civil servants but to Ministers. The challenge to Ministers brought into prominence the much underrated problem of the handling of a large team of departmental Ministers. In DTI we had nine. There were four pairs of Ministers (one Minister of Cabinet rank, though not in the Cabinet, and one Parliamentary Secretary) and one principal spokesman in the House of Lords.

Mr. Peter Walker, who succeeded Mr. John Davies as Secretary of State, took a special interest in this problem. He tried, as had Mr. Davies, to give them job satisfaction by delegating to them as much

responsibility as he could. The House of Commons did not take too easily to this, as they naturally preferred to be able to get at the head man; but they gradually got accustomed to it. Some industries did not much like it either, as they felt that 'their' spokesman was no longer so senior as his predecessor: this applied, I think, particularly to the energy industries. On the whole, however, the arrangement worked reasonably well for most of the time. Mr. Walker thought it particularly important that his Ministers should think and act as a team. He therefore had a daily meeting with them, and this too was successful.

The development and co-ordination of policy and information was a matter to which both the Secretaries of State and I gave much attention. A department's policy stems in part from the Party Manifesto and in part from the continuing experience of the department. Usually, however, there is no single document in which the various strands of the policy are drawn together. The momentum tends to be provided by the legislative programme, the general intentions expressed in the Queen's Speech, the execution of policies already announced and the impact of external events. In DTI we thought that something more was required. So every six months we compiled—and issued to all the senior staff—a document entitled *Policy Developments*. It began with a statement of about a dozen general objectives. It then listed the principal policy developments of the previous six months. Finally it set out those policy developments ('major' and 'minor' in separate sections) which were intended to be brought about during the following 12 months. This document was compiled by the Central Secretariat (headed by an Under-Secretary) under the direction of the Top Management Group (a body of about 10 top officials which met weekly under my chairmanship) and it was, of course, submitted to the Secretary of State and his Ministers for approval.

The organization of the Department at official level presented particular problems owing to the large number of very senior posts involved. We began with two Second Permanent Secretaries and finished with four. The position of Second Permanent Secretary is not easy, especially when there is more than one in a department, and it can become frustrating. The holder of it has the satisfaction of being in charge of a large block of work such as Shipping and Aviation or the Energy Industries. He is also an Accounting Officer but not in the full constitutional sense because he does not have complete charge of the staff who work for him. He cannot, for example, move his staff about without first consulting the Permanent Secretary. No doubt he also sometimes feels that if the machinery of government were different he might well be the Head of his Department.

In DTI I was very conscious of the sensitivities of this situation and, though I cannot claim to have been completely successful in dealing with it at all times and in all cases, I did try to help in one way that seemed to me important. This was by arranging that each Second Permanent Secretary should be regarded, inside and outside the Depart-

ment, as the principal adviser on his group of subjects not only to 'his' Minister but to the Secretary of State. This did not mean that I myself was short of work or that that work was limited to establishment and finance and to external contacts. The Second Permanent Secretaries kept me well informed, and of course there was plenty of co-ordination to do in the interests of trying to help establish a coherent industrial policy all across the board, at home and overseas, in changing political and economic circumstances.

At least down to Assistant Secretary level and in relation to the Regional Offices we had to consider how to achieve adequate delegation, how to co-ordinate and inform and how to hold a sensible balance between the two. On delegation, we arranged that all Ministerial correspondence should be referred direct to an Assistant Secretary and that the draft replies should go back direct to the Private Office concerned, unless the Assistant Secretary concerned specially wished any of his superiors to see it. If he did not, he was to use his discretion about sending one or more of them a carbon copy of the draft reply so that they could intervene if they wished to do so.

In the sphere of information I, like all Heads of Departments, held a Monday morning meeting for one hour. Owing to the size of the Department this had to be limited to Deputy Secretaries (and their equivalent) and, of course, the Second Permanent Secretaries. This meant that I saw much less than I should have liked of the Under-Secretaries, though naturally I met a good number of them in the ordinary course of business. If the creation of the new Department had not demanded so much time this problem could have been solved—or at any rate mitigated—by visits to the various Divisions. When I joined the Board of Trade as Permanent Secretary in 1968 I took every afternoon off for several weeks and visited most of the staff in the various Divisions and discussed their work with them. This enabled me to meet some 7,000 people and was, of course, extremely helpful and informative so far as I was concerned.

By way of written information we had in DTI, in addition to the six-monthly circulation of *Policy Developments*, a weekly circular for senior staff giving information about the main policy matters currently under consideration by Ministers and top officials and news of parliamentary matters of concern to the Department. We also prepared a regular, and excellent, newsletter about EEC developments, which was circulated to other departments as well as our own. In addition there was a brief *Information Bulletin*, issued weekly, giving news and forecasts of matters of interest to the Press. Finally there emerged a departmental newspaper, entitled *Ti-Line*, which was circulated to the whole of the staff. It was in tabloid form, like the newspaper that I had started in MPBW and which I believe still survives in the Department of the Environment.

Delegation and information were also highly relevant to the Regional Offices. The integration of the Regional Offices naturally presented some problems, but with goodwill, which was readily forthcoming,

these were solved without great difficulty. These integrated offices proved invaluable in times of crisis as we were able to concentrate staff on the particular emergency concerned. Indeed, during the difficult winter of 1973–74 we borrowed some staff from the Regional Offices of other departments as well.

Regional Offices do not always receive the attention that they deserve. Senior officials in London can easily overlook the fact that for much of industry Regional Offices rather than Whitehall are industry's main point of contact with government. The quality of their staff and their performance are therefore very important to the relations between industry and government.

The lesson from the Ministry of Supply, mentioned at the beginning of this article, is based on the most notable invasion of businessmen ever organized by a government department. Among the Under-Secretaries were Lord Woolton, Lord Layton, the future Lord Chandos, Sir Andrew Duncan, Sir Cecil Weir and Ashley-Cooper from the Bank of England. I remember too that among the newly-recruited Principals was a philosophy don called Oliver Franks. In a Department like DTI the Civil Service could clearly not supply all the expertise required. So we recruited some 30 businessmen (industrialists, merchant bankers, accountants and management consultants) and a resident trade union adviser. I was also anxious that more civil servants should acquire first-hand experience of business life, and we eventually managed to find places in the City or industry for 12 people from the Department.

Finally, in any large department, the quality of the Principal Establishment Officer and the Staff Side are essential ingredients of success. In DTI, as in MPBW, we were very fortunate in both.

In this article I will not dwell on the separation of the energy industries in late 1973 into the separate Department of Energy: this had important disadvantages, but it was understandable in the circumstances of the time. Nor has the day yet come to discuss the extremely abrupt and unexpected breaking up of DTI after the General Election in March 1974. I should prefer to end with two quotations. The first is from an article that I wrote about DTI in January 1972, for this may give readers something of the flavour of the task that we were set and the spirit in which we tackled it:

> No one can fail to be stimulated by the range of problems facing DTI. Entry into the European Economic Community; the restructuring of British civil aviation and the future of the aerospace industry; energy policy and its impact on the massive industries concerned; regional industrial development; the reform of competition policy and company law; the future of an important sector of Government research and development: these are but a few examples to add to the evolution of the Government's relations with nationalized industries on the one hand and private industry on the other.
>
> These and other major problems have been pursued systematically during the last 15 months. At the same time the Department has largely carried through,

at the request of Ministers, a thorough-going review of its functions. Some have been abolished, others modified and numerous advisory bodies have been discontinued.

All this work has been done in the setting of an economic situation of some complexity which has presented a number of demanding challenges both to industry and to the new Department.

Against this background the task of management is to establish a balanced and responsive organization, adaptable to changing circumstances, able to handle effectively both strategy and tactics in conditions of heavy pressure and fast-moving events, and capable of attracting the continuing loyalty of those who serve it.

The second quotation is from my Guest Editorial, written in April 1973 for the hundredth edition of *DTI This Week*, the weekly newsletter for senior staff:

So what precepts does my personal experience prescribe for the management of DTI? Go for quality wherever it is to be found and get the right mixture of skills. Strive to be clear, practical and simple: people who make things sound complicated have often not understood them well enough. Avoid Parkinson like the plague.

Identify your objectives with care and spend time on telling your colleagues what they are. Delegate to your staff and trust them—and support them when they are in trouble. Establish a sense of success and have as good and quick a system of two-way communication as can be devised, both inside and outside the Department.

Above all, perhaps, encourage a broad outlook and never let the Department become introspective. Get out of your office as much as you can. Stay close to the realities of industry and commerce, always maintain an international perspective and give pride of place in your thinking to the needs of the 'customer' in his or her many manifestations.

The Basic Structure of Accountability and Accountable Management in Government Departments

S. D. WALKER, CBE, Civil Service Department

Until his retirement at the end of 1977, 'Johnny' Walker was Head of Management Services (Special Assignments) Division, CSD. He is currently engaged on a part-time basis in funding experience gained on management reviews of government departments. The following article is a revised version of a paper which was circulated by CSD to those attending a recent seminar at the Civil Service College on accountable management. —*Editor.*

Introduction

The Fulton Report on the Civil Service recommended that the principles of accountable management should be applied to the work of government departments. Much of the subsequent discussion of this has tended to concentrate on the difficulties of a practical kind encountered by departments in seeking to measure and evaluate results. This article does not attempt to consider those problems. Its main purpose is to set out a conceptual framework for accountable management within departments in the light of the requirements of public and parliamentary accountability. It also discusses some of the constraints upon setting up discrete 'accountable units of management' within departments.

Chapter 5 of the Fulton Report discussed the 'Structure of departments and the promotion of efficiency'. Its general theme was that organizational arrangements should encourage efficiency by providing clear definitions of authority and by holding individuals accountable for their performance. After noting that government departments face particular difficulties in delegating authority, the report concluded that there was scope for organizing 'executive activities' so that the principles of accountable management could be applied. It defined accountable management as 'holding individuals and units responsible for performance measured as objectively as possible'. The achievement of this was seen as depending upon 'identifying or establishing accountable units within government departments—units where output can be measured against costs or other criteria, and where individuals can be

held personally responsible for their performance'. Recent reports from the Expenditure Committee have underlined its interest in the development of these 'accountable units of management'; and have recognized that their development must not detract from the accountability to Parliament falling on Ministers and Accounting Officers.

Particularly where more than one Accounting Officer is appointed in the same department, there are questions which arise in formulating a precise statement about the nature of the relationship between Minister and Accounting Officer. For the purposes of this article these can be put on one side. It is not necessary here to distinguish between the general external accountability of the Minister and the specific accountability of the Accounting Officer to the Select Committee of Public Accounts. The article therefore refers to the external accountability for the affairs of a department, including accountability to Parliament, as resting on 'the Minister and his Accounting Officer(s)'.

What is relevant in the context of this article is the distinction between the accountability to external authorities resting on the Minister and his Accounting Officer(s) and the accountability of staff within the department to the Minister and his Accounting Officer(s). This article discusses two basic propositions. The first is that accountability to external authorities rests exclusively with the Minister and his Accounting Officer(s). The second is that delegations of authority within a department, and the resulting chain of internal accountabilities to the Permanent Secretary and Minister, must be compatible with and support the overall responsibilities and external accountability resting on the Minister and on the Permanent Secretary in his capacity as Accounting Officer.

External accountability

The external accountability falling in its different ways upon the Minister and his Accounting Officer is personal in the sense that they cannot transfer their accountability to someone else. It is also comprehensive and covers both the policies pursued by a department and the way in which they are implemented. This is common form. Most general theories of organization see overall responsibility and external accountability for an enterprise resting either on one individual or on a corporate board.

It would manifestly be impossible for a Minister and his Accounting Officer to take all decisions themselves. They therefore have to delegate authority to the staff of the department to act for them. Many of the decisions taken at subordinate levels will relate to the planning and control of work, the allocation and use of resources, and the organization and staffing of the department. That is to say, they will be decisions in the field of management.

The *overall* responsibility for the affairs of a department resting upon the Minister and his Accounting Officer cannot be delegated to a subordinate: like accountability (which is its formal external face), it

cannot be transferred. But the volume of business requires the allocation of responsibility for *particular* matters to subordinate staff and the delegation of commensurate authority to them. These internal allocations of specific responsibilities and internal delegations of authority depend upon the concurrent introduction of a chain of internal accountability; upwards through the management hierarchy to the Permanent Secretary and the Minister. It is the preservation of this internal chain of accountability—and the monitoring arrangements whereby it is achieved and demonstrated—which ensures that the internal allocation of responsibility and delegations of authority do not diminish the overall responsibilities and external accountability of the person—or corporate body—in charge of an organization.

There is no reason in theory why the delegation of authority within a department should detract from the personal external accountability for its affairs which falls upon the Minister and Accounting Officer. But it is important that delegations and monitoring arrangements should be designed not only to facilitate the conduct of affairs but also to support those at the top upon whom external accountability rests.

It can, therefore, be misleading to use words like 'freedom' and 'autonomy' in discussing delegated authority within an organization because such words may convey a degree of 'independence' which would not be appropriate within a management hierarchy, and for which, in our system of government, there is no legitimate source of political authority. Clearly, if a superior checked on each and every decision taken by a subordinate to whom he had delegated authority, the discretion of the latter would be non-existent and the delegation would be meaningless. So the monitoring arrangements which are adopted must both safeguard responsibilities and accountability at the top while permitting discretion to be exercised lower down. Some element of risk is involved in all acts of delegation by a senior manager, but this is reduced if his subordinates are not only carefully chosen and trained but are involved in planning and policy formulation and kept informed of current policies and priorities.

Individual officers in a department may often feel a personal accountability towards the members of the public with whom they come into contact or towards particular 'clients' for whom they provide a service. This is natural and can be an important element in the desire to do a good job; it is right that staff should feel a personal responsibility for providing an efficient but sympathetic service to the public and for acting as a channel of communication so that the department can respond appropriately to public needs. But individual members of the department are assisting the Minister to discharge *his* external accountability; they answer to him for this through the management hierarchy and they cannot be directly answerable to the client or member of the public.

In order to facilitate parliamentary control over the Executive, some Parliamentary Committees have proposed that the performance data

by which the head of an accountable unit is held accountable should be made available to them. More recent comments* recognize that the question of availability to Parliament of such information on the costs and results of a component part of a department cannot be properly considered without regard to the accountability of the Minister and the Permanent Secretary for the department as a whole and for all its components.

Accountable management within a government department must, therefore, be developed in a way which safeguards and supports the external accountability falling on the Minister and his Accounting Officer. (By contrast, the transfer of functions to a 'hived-off' non-departmental body deliberately removes direct ministerial responsibility and therefore alters the position in respect of external accountability.)

Internal accountability

Although the 'ideal' concept is that of the single superior, and departure from it always involves dangers and difficulties, in practice the lines of internal accountability are often, and often have to be, complex. Some responsibilities, e.g. for aspects of resource control and of personnel management, are allocated on an across-the-board basis to the Principal Finance Officer or to the Principal Establishment Officer. Responsibility for taking the lead within the department on formulating and reviewing particular policies is placed on the head of one or more policy divisions; another senior official may have responsibility for implementing policies and for oversight of a large executive machine, e.g. a network of regional and local offices. Special organizational arrangements are often made for professional and other 'specialist' staff who have a managerial accountability to their line manager while retaining a relationship with, and 'professional' accountability to, their 'head of profession'.

***Note**

'It would not, however, be appropriate for the House to seek directly or through its committees to enforce its rights to secure information from the Executive at a level below that of the ministerial head of the department concerned (normally a Cabinet Minister) since such a practice would tend to undermine rather than to strengthen the accountability of Ministers to the House.'

[Paragraph 7.20 of First Report from the Select Committee on Procedure for Session 1977/78.]

'The Estimates procedure should lend itself to the development of internal management accounting processes. Wherever possible, a department's administrative Votes should be directly related to its organizational structure. Votes should show the administrative cost of each programme. It would be for the House of Commons through its Committees to cross-question the Departmental Accounting Officer on any shortcomings, the managers of accountable units being directly responsible to the Accounting Officer rather than to the House of Commons.'

[Paragraph 27 of the 14th Report from the Expenditure Committee for Session 1977/78.]

When responsibility for particular functions is allocated on an across-the-board basis, delegations of authority will be routed accordingly. A 'line' manager may properly have to answer to the Principal Establishment Officer for the discretion allowed to him in respect of a 'manpower budget'. He will be subject to staff inspection on behalf of the PEO and to audit on behalf of the PFO. These and other forms of special or 'functional' accountability need to be clearly identified and defined; and they should be distinguished both from the main line of managerial accountability and from working relationships which, though important in facilitating the conduct of business, do not result in the creation of a formal accountability.

But however complex the organizational arrangements may be, the lines of internal accountability come together when they reach the Permanent Secretary and Minister. The managerial structure of departments therefore expresses the pattern of internal accountability which has been developed to discharge their functions in support of those who carry overall responsibility and external accountability.

The Fulton definition of accountable management referred to holding 'individuals and units' responsible and the report said that its achievement depended upon identifying or establishing accountable units within departments. Accountability can only be placed upon and discharged by individuals (or truly corporate bodies). The phrase 'accountable unit of management' can, therefore, best be interpreted as meaning 'a unit whose manager possesses a high degree of delegated authority because he can readily and beneficially be held accountable, within the department, for the resources used and the results achieved'.

In all organizations a balance has to be achieved between the benefits of centralization and decentralization of authority, but the personal accountability of an individual manager will always be limited in certain respects. The only general principle is that authority and accountability should be commensurate. A manager should be held accountable for the discretionary use of the authority delegated to him. He cannot be held accountable for the effects of decisions taken by others and outside the limits of his authority; though he can be held accountable for the way in which he responds to the repercussions of such decisions as they affect him and his staff. Accountability should, however, be distinguished from culpability. All delegations involve some element of risk of a 'wrong' decision: this risk has to be weighed against the benefits of increased efficiency in discharging business. The question is whether the risk was excessive. Although senior managers must be prepared to answer for matters within their responsibility, culpability in respect of an error by a subordinate can only be judged in the light of the circumstances including, in particular, the procedures in force for control by the subordinate and for monitoring by the superior.

It will be seen that total accountability for the overall results achieved by a department and for the results achieved by any component part of a department can rest only on the Minister and his Accounting

Officer. Only they have the total authority needed to comprehend and answer for all the decisions in respect of the policies, financial resources, human resources and operational processes which may influence the results achieved by each component part of a department. The extent of the personal accountability properly falling on individual managers within the department has always to be related to their personal contributions within the limits of the authority delegated to them.

Organizational results have to be distinguished, therefore, from individual performance. Results reflect the contributions of many individuals and co-operation between them. The task of the manager is to encourage his staff so that their individual and joint contributions are directed towards improving the results of the organization in which they work. Managerial performance is judged by success in discharging this task.

The various ways in which managers can seek to improve organizational performance in practice are beyond the scope of this article. It is important to note, however, that the underlying principles of personal accountability for management described here remain valid for all acceptable styles of management. A participative style will lead to the involvement of staff in agreeing the results to be achieved and the methods to be adopted, encouragement of team working and an emphasis by the manager on supporting as well as leading the staff of his unit. Such arrangements may make new demands on the manager but they should not conflict with nor diminish his accountability for his personal performance as a manager in using the authority delegated to him. All styles of management have ultimately to be judged by their effects in the longer term on organizational performance.

In the context of the Fulton proposals on accountable management, the crucial questions for a government department are what sorts of authority should be delegated, how much and how far down the line in order to secure the economical, effective and efficient discharge of its business while supporting the discharge of external accountability for its affairs; and how far the organization can and should be so adapted as to concentrate these delegations on individual managers in such a way as to maximize the scope of their internal accountability.

Accountable units of management

The Fulton Report saw accountable management as having its main application in 'executive' activities to implement policies. In departments with responsibilities for implementation of policy, it recommended the introduction of accountable units of management—'units where output can be measured against costs or other criteria and where individuals can be held personally responsible for their performance'. In other words, it was concerned with the organizational expression of a 'managerial delegation' of authority in respect of human and financial resources and with performance as a manager in achieving results with those resources through the use of his delegated authority. This concept

implied the organization of departments into relatively discrete areas of work under managers with a considerable measure of delegated authority and commensurate internal accountability.

In exploring the application of this approach within the Civil Service, it has become clear that there are important constraints which have to be observed and also that there can be disadvantage in trying to draw too sharp a line between areas of a department which take the form of an 'accountable unit of management' and those which do not, since the differences between them are less extreme than this would imply.

Some general constraints on the delegation of authority in respect of resources are inevitable in any situation where it is decided to settle some matters, such as pay and conditions of service, centrally. In the Civil Service, some costs of a department are controlled centrally and do not fall upon its Vote. Within departments, the managerial level at which particular costs can most appropriately be controlled will vary according to circumstances. The continuing dialogue with the Expenditure Committee, or with any successor Select Committees monitoring the activities of departments, will lead to a closer scrutiny of the extent to which the present pattern of control is right and can be justified. At present it is the case that it is not possible over a wide range of departmental work readily and accurately to cost the total resources consumed by particular organizational units. It will become increasingly important to ensure that adequate information is available both for costing policy options and for purposes of management control. Nevertheless, it seems clear that the extent to which individual managers can be held accountable for the costs incurred by 'management units' within a department will vary and will always be subject to some limitations. At the same time all managers have responsibility for the management of their staff and other resources allocated to them.

In practice, the situation in the Civil Service as regards control over the staff and financial resources allocated to a manager differs only in degree and detail rather than in kind from the position in many large commercial and industrial organizations where there are also usually limits on the discretion of individual managers in respect of personnel management matters and financial expenditure.

In the Civil Service, a more significant constraint on the scope for delegation may arise from the difficulties which are encountered in specifying the results to be achieved by an individual 'management unit' and relating resources to them. There are genuine difficulties in seeking to establish objective criteria by which the effectiveness of a unit's performance can be judged. There is no single or consistent measure which can be applied to all Government policies and, where individual policies are concerned, their intentions are frequently expressed in broad and subjective terms which make it difficult to devise specific criteria for assessing their effectiveness. This difficulty is inherent in government where both judgements of effectiveness and

judgements of competing priority are to a large extent political in character. However, this does not mean that it may not be possible (and to a greater extent than we may at present recognize*) to establish intermediate measures which can provide some worth-while indication of a unit's performance.

The ability to define and measure results does not, however, necessarily lead to a high degree of delegation of authority. Other considerations may be involved. The need to achieve a high level of equity and consistency in implementing policies may act as a constraint. On the other hand, delegation of authority can usually be practised more confidently if some objective data are available for measuring results and monitoring performance. It is then easier to ensure that the performance indicators which are introduced for the purposes of internal management and internal accountability are consistent both with the aims and current strategic objectives of a department and with performance indicators which may be used for discharging external accountability.

Another important constraint on the introduction of 'accountable units' is that they imply a form of organization in which a particular unit of management has a sufficiently discrete task to make it sensible to isolate it within the structure. In practice, the objectives not only of government departments but also of units of management within them are complex and interrelated in a way and to an extent which limit the number of tasks to which this approach can successfully be applied. A complementary point is the extent to which it is impossible to insulate units of management against the effects of the competition for resources between policies. It may be impossible to find the resources for new policies except by reducing the resources being used to implement current policies. Such a reduction may only be possible by reducing standards of effectiveness. Changes in priorities between existing policies may also require reallocation of resources and changes in standards. If a department is to maintain the most effective use of the resources available to it, it will therefore find it necessary to switch resources as policies and priorities change and there will infrequently be sufficient stability in these for top management within a department to avoid intervening to make changes in the objectives and the resources of individual units. The task of achieving within a department the best overall balance in the application of resources requires the exercise of a series of subjective judgements about effectiveness and priorities which can best be made by those at the top of the department: they can more readily take an overall view and it is on them that accountability must fall for the results which are achieved. This inevitably limits the extent to which delegated authority can operate against a

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* See Brian Currie's article 'Framing Targets for Accountability' in the August 1978 edition of *MSIG—Editor.*

background of stability and lack of intervention by senior management in the affairs of a unit.

These considerations must not be taken as arguments against a clear emphasis within departments on managerial accountability. There is a need to establish as clearly as possible the objectives and priorities governing the activities of individual managers. There is a need for improved management information and accounting systems to provide the necessary basis for sound decision-taking, effective control and the better assessment of performance. These systems need to be tailored to the requirements of individual management situations. However, the frequency with which it is possible to isolate a particular unit of management within the structure of a department and to provide it with stability both in terms of the resources which it has available to it and the results which it is being asked to achieve will be limited. There will in practice always be a range of situations within a department with variations in the extent to which there is scope for the establishment of 'accountable units of management' in the full sense of this term as defined by Fulton. Arguably, it is unprofitable to define the point on the spectrum at which a part of a department qualifies for designation as an 'accountable unit of management' and the application of a label of this kind to a limited series of defined situations could lead to the mistaken supposition that the elements of accountability and effective management required to meet the Fulton prescription need not be practised elsewhere. From this point of view, there is a need across the whole range of departmental activities to continue efforts to clarify individual responsibilities and authority; to specify policy aims and management objectives; and to define standards of effectiveness and to measure costs and outputs wherever it is found to be possible to do so. As noted above, efforts in these directions are not incompatible with the development of a participative style of management.

Equally, it is important to recognize that within the Civil Service the emphasis on uniformity and the difficulty in determining standards of effectiveness inevitably reinforce a natural tendency which is inherent in all organizations towards the centralization of authority. It is all the more important in government departments to ensure that the benefits of delegation of authority are not overlooked in searching for the best balance between centralization and decentralization.

Storekeeping and Storehouse Management

A. PHILLIPS, Civil Service Department

From time to time new titles are added to the Management Services Handbook series; the latest of these is *Storekeeping and Storehouse Management.*

This short guide is intended for those in government departments which have no specialized procurement responsibilities and in which the oversight of a perhaps limited stores operation could be a function allocated to managers who lack such previous experience and for whom some basic guidance would be helpful. As with other titles in this series, however, it is hoped that the guide will also prove useful to management services practitioners, staff inspectors, auditors and others charged to carry out studies in organizations involving stores.

With this in mind the guide has been structured so that those who have an overall rather than an immediate and detailed responsibility can gain the rudiments of appraisal of their supply organizations from one chapter (Policy Decisions) and a check list; those who have a responsibility for supply policy within a department, or who, while not themselves supply managers, have an executive responsibility for the control of a stores organization, will find what they need in Part I. Part II, on storekeeping, deals with the main considerations necessary for the smooth running of a fairly large store, recognizing that these principles will apply, *pari passu*, to stores complexes of different sizes; a separate check list is provided to complement this section for the Stores Manager. Management services practitioners and others concerned with the examination of stores areas should find both check lists helpful.

The application of the guide to the supply organizations of individual government departments will be a matter of interpretation, and, as departments' commitments differ widely, so will procedures derived from the same basic principles tend to vary. The guide is, therefore, in no way intended as a substitute for departmental instructions.

The advice in the guide is not original; the guide draws heavily on the work of those who have had considerable experience of stores operation within the government service; its virtue is in attempting to bring this together in a readily digestible form. However, because it covers only the *main* elements of good practice, readers are provided with a list of suitable reading material with which to extend their knowledge and with contact points for specific areas of advice.

Departments may obtain copies of the handbook (General Service Forms Series, E142) from Her Majesty's Stationery Office through the normal departmental publications demand channels. Persons and organizations outside the Civil Service may obtain copies from The Librarian, Central Management Library, Civil Service Department, Room 1/1, Old Admiralty Building, Whitehall, London SW1A 2AZ, price £1·15. The price quoted includes postage (within the United Kingdom) for a single copy, and orders must be accompanied by a cheque or postal order, made payable to 'Civil Service Department', for the appropriate amount.

Self-instruction Newsletter

Training Division, CSD, has recently produced the first issue of an interesting and well-designed Newsletter on the methods and uses of self-instruction in departments. Though produced mainly with trainers in mind, the Newsletter adopts an informal and readable style that could also make it of some interest to the general reader—and especially for anyone else wanting inspiration on how to produce a similar Newsletter for their area of work.

The idea for the project was first suggested early last year at a Civil Service College senior seminar on self-instruction. The value of this form of training is being increasingly realized by departments, and it was felt at the seminar that a central publication to spread news about its application could be of considerable benefit to trainers throughout the Service.

The first issue of the Newsletter contains useful information from a wide variety of sources. For example, there is an article giving details of new self-instructional material being prepared by the Home Office Unit for Educational Methods; this material includes a handbook for officers whose work is concerned with parliamentary questions and a structured guide, *The Way Ahead*, for people preparing for examinations. The Newsletter also contains an article on the recently established 'Learning Resources Centre' at the Sunningdale centre of the Civil Service College. A Learning Resources Centre, as the article explains, is a storehouse of material from which, with guidance, people can learn by finding out for themselves.

Anyone seeking further information on the Newsletter is invited to contact David Lewis in Training Division, CSD (Room 3/59, Old Admiralty Building, Whitehall, London SW1A 2AZ; telephone 01-273 5797).

The Role of the Microcomputer Workshop

R. E. DIBBLE, Civil Service Department

Roy Dibble is a Principal Professional and Technology Officer. He heads the Microcomputer Workshop, which is in the Technical Services Division (C3) of the Central Computer Agency (CCA). —*Editor.*

Aims and resources of the Workshop

The Microcomputer Workshop was set up in 1977, with three main aims. Its first aim is to act as a focal point for those with shared interests in microcomputers; it is not to be a controlling 'overlord' or to corner the market of microsystems development in government. To this end it has been decided that a practical approach is probably the best and it is hoped to achieve this by identifying and solving the problems. There is also a need to co-ordinate the work already done in this area and to provide guidelines for systems analysts.

The second aim of the Workshop is to provide assistance in the grey area of manufacturer support, or rather the lack of it! When building a system the software components of driver routines and interfaces are often not available; it is proposed, therefore, to inaugurate and maintain a library of such aids within government, thus reducing one limitation of microcomputer-based systems.

In parallel with the above, the evaluation of microsystems, packages and devices currently offered will form the basis of an information source in this rapidly advancing area. Potential users will not have to sift through the ever-growing list of possible solutions and the Workshop, in turn, should obtain comments and findings from others to augment the information now held by CCA.

The third aim is to establish a design and development organization to examine the potential problems associated with development of microcomputer systems. To substantiate this, a variety of practical applications is being tackled and the difficulties examined in detail.

Resources of the Workshop include engineering staff from the Technical Services Division and the CCA computer bureau at Norwich, plus the hardware necessary for the task. General systems consultancy services are also available from the System Consultancy Division (C6) of CCA.

A potential microcomputer user in government can use the above facilities at Riverwalk House to develop systems or acquire the necessary skills without the expense of purchasing a computer-based development system, and be able to return later for future enhancements and changes.

The equipment range

Workshop equipment is based on a PDP11/34 host machine and a range of target microcomputers which represent over 80 per cent of the general-purpose microprocessor-based hardware currently being produced.

By using a mini-computer as a host machine, the software utilities provided by the manufacturer are available as an aid to more rapid program development. The file handling, editing and cross compilers reduce the amount of training required as they simplify program development and help to bridge the gap between mainframe and micro for programmers trained on machines supporting high-level languages.

Microcomputer systems in use are the Intel 80/10, Motorola 6800 and the Zilog Z80, with a range of peripherals. These allow flexible configurations to be built to cover most data processing demands, although the majority of systems require little more than a teletype, processor and backing store device. Recent additions to the equipment include a Zilog MCZ system with a resident assembler, Cobol translator and Basic interpreter; and a cursor addressable visual display unit and parallel printer. A Commodore PET microcomputer is also used for training and interface tasks.

One problem area in program testing, especially with assembly level programs, is the debugging of logic errors, and the need to discover the events actually taking place when they differ from the expected results. A powerful tool to assist with this is the CAP MicroAde Universal Development System. As well as providing cross assemblers and a micro-Cobol language cross translator for the microcomputers, it also has a powerful debugging system which is fully interactive. This process allows the programmer to examine program events as they occur, trace the sequence of instructions and amend or modify them without needing to recompile, so reducing the time and effort required in producing robust, reliable programs.

Backing up this display of hardware and software is a well-trained technical team of engineering and system staff. The Workshop is staffed and equipped to help and advise, but realizes this is only part of its role. Those outside also have a part to play, as their contributions and interest can help shape the work done to ensure that the focal point is maintained as a collector and disseminator of practical information.

The more frequent problems

Microprocessor manufacturers and their distributors provide very little in the way of software support, so Workshop staff have evolved some routines of their own to reduce this problem. If you have a solution or problem in this area the Workshop staff would be pleased to hear from you. Data acquisition, in building up files for subsequent processing and an easy, error free, fast transfer of data between micro-based systems and mini-mainframes on a common magnetic media, is typical of the problem frequently encountered.

Purchase of unbundled kit and building to the designers' specifica-

tions may produce a precise, tailored system, but the lack of driver routines may mean either a long timescale while such items are developed, settling for a less effective design, or possibly abandoning the project completely.

The experience to date with other users has shown that although 'a problem shared may not be a problem halved' it is always a fruitful exercise and may generate a new approach, if not the complete solution, to the problem.

Successes and developments

When choosing a computer system there is always a trade-off between self or pre-assembly and subsequent reliability. CCA staff have assembled a Motorola 6800-based system from a kit and are monitoring its failure rate to determine the most cost-effective method of providing the hardware for a system. The sample size of one is a limiting factor for interpreting mean time between failures; our results to date indicate that the most likely sources of failure are the connectors, rather than the integrated circuit components.

In the combined area of hardware/software the Workshop has developed a software handler to drive the dual diskette controller which will enable application programs to be written independent of any file handling sub-routines incorporated in the development system. To overcome the constraints imposed by some development systems and lack of monitor facilities, port addressing latches have been evolved to enable concurrent use of peripherals. This is leading to vectored interrupt handling to permit several visual display units to access a file for interrogation as a micro-based workstation.

A further library of application programs has been produced. Some are part of demonstration packages to show the range of capabilities of the various microcomputer configurations, and others are turnkey systems developed for users. The library contains file interrogation, mailing lists, registry and personnel/vacancies matching programs, all of which have been designed and written by Workshop staff. Currently under evaluation or development are vehicle location, stock handling and management information systems. All appear feasible and within the current restraints of microcomputer systems capabilities.

Conclusion

It is not the intention of the Workshop to provide rigid guidelines for mass circulation; all the answers are not known (nor all the problems) and changes take place too frequently to commit anything other than outlines and technical reports of products to print. However, the CCA Microcomputer Workshop staff are willing to act as a sounding board for ideas and a collector/disseminator of facts, and contributions from others will help to increase their effectiveness. A telephone call to the author (Riverwalk House 01-211 0038) will give you details or more general information on any of the above topics. Equally he will be pleased to accept any offers of assistance or advice.

The Road to Cardiff

The development of MOD's dispersal network

C. H. B. PARDOE and I. F. WILLIAMSON, Ministry of Defence

Colin Pardoe and Ian Williamson are in the Management Services (Organization) Division, Ministry of Defence. —*Editor.*

Introduction

Following consideration of the Hardman proposals for dispersing work from London, the Government decided that the Ministry of Defence (MOD) should disperse some 10,000 jobs to Cardiff and Glasgow in the 1980s. The first phase of the Cardiff move (about 400 posts) is due to take place in 1982 with the final moves bringing the total up to some 4,250 posts by 1984. Essentially these posts will be from the Procurement Executive area (Master General of the Ordnance, Controller Aircraft and Defence Contracts) together with supporting services.

A new division—Civilian Management (Dispersal), CM(D) for short—was set up in MOD to prepare for dispersal, and as the pace of planning increased so CM(D) developed a 'project management plan' in the form of a bar chart. Although this was adequate in the early preparatory stages, as the dispersal plans became more detailed a more comprehensive method of controlling them, and ultimately dispersal activities, became necessary.

CM(D) therefore invited the Management Services Division of the Ministry of Defence to devise a central management information system to enable them to co-ordinate the plans to implement the Cardiff dispersal programme. Whatever management tool was designed had to be flexible enough to be capable of being kept up to date by a small staff, yet, at the same time, sufficiently detailed to allow easy monitoring of progress and the identification of potential blockages in time for remedial action to be taken. It had also to be readily adaptable to the Glasgow dispersal exercise.

Various planning control methods were considered including listing activities and bar charts (or the more sophisticated Gantt charts). But perhaps inevitably with such a complex operation the preferred solution was that project network technique (PNT)* should be used since this is the best means yet devised of showing on paper all the activities involved in a project of any size or complexity and of showing the logical dependencies between activities.

*A description of this technique is given in *Networks Explained* by F. Offler, published by the National Computing Centre.

Setting to work

The first objective was to break down the project into identifiable main areas of work over and above the main Procurement Executive function; these included such tasks as, for example, the provision of reprographic services, the setting up of transport services and canteen facilities. It was necessary then to establish the lead division or authority responsible for the facility, service or activity. A brief of requirements at Cardiff prepared by MOD for the Property Services Agency and a glossy PSA brochure on the St. Mellons site were the only documents available when the Management Services team set out.

Then followed our first discussion which was with the PSA's project controller responsible for the Cardiff site—this was to ensure that a clear distinction was drawn between PSA and MOD activities. We learnt that PSA had appointed a firm of consultants (IDC Project Management Consultants Ltd.) to plan PSA activities, and it was therefore necessary to discuss our plans with these consultants to identify the interfaces between the activities of PSA and MOD so that where necessary they were taken into account in our network. Basically the building programme will be in two phases.

Initially 54 action divisions and 42 main areas of work were identified covering such diverse factors as computer facilities, housing, provision of banking facilities, communications, even a helipad, all within MOD except for the setting up of the staff restaurant, which was the responsibility of the Civil Service Catering Organization, and the move of related Exchequer and Audit Department staff.

Activities

The next phase was what one might term the 'leg work'. Over a period of two months a total of 30 interviews and/or mini-conferences were arranged. Each action division was asked to identify all the activities it would have to undertake in order to complete the task required of it, and was also asked to establish the logical dependencies between activities. With their increasing knowledge and experience the Management Services team were able to help the divisions direct their thoughts to all aspects where they had an involvement including many where, at that stage, they had not appreciated their role, thereby helping to ensure that no activities were omitted. At this stage of the proceedings approximately 730 activities were separately identified.

Having identified the activities and who was responsible for them, the next step—to take the network beyond the logic stage—was to obtain the expected duration time for each activity from the action divisions. From the initial interviews which had been conducted by the Management Services team it was soon found that the direct question 'How long would that activity take you?' inevitably enlisted the response 'I have no idea'.

It was therefore decided to use the 'three times formula' whereby the responsible divisions give their own estimate of the most optimistic

time, the most likely time and the most pessimistic time they would expect to take for the activity; to these a recognized formula is applied. As the project spanned up to six years it was decided that all duration times would be expressed in weeks. In order to get this information a questionnaire was devised which, for each division individually, listed all the activities for which the division was responsible within each main area of work. These questionnaires also led to divisions examining more critically their roles and tasks and this in turn led to further activities being identified. Overall this part of the assignment took almost three months, although the team was able to commence developing the outline of the network logic once the majority of replies had been received.

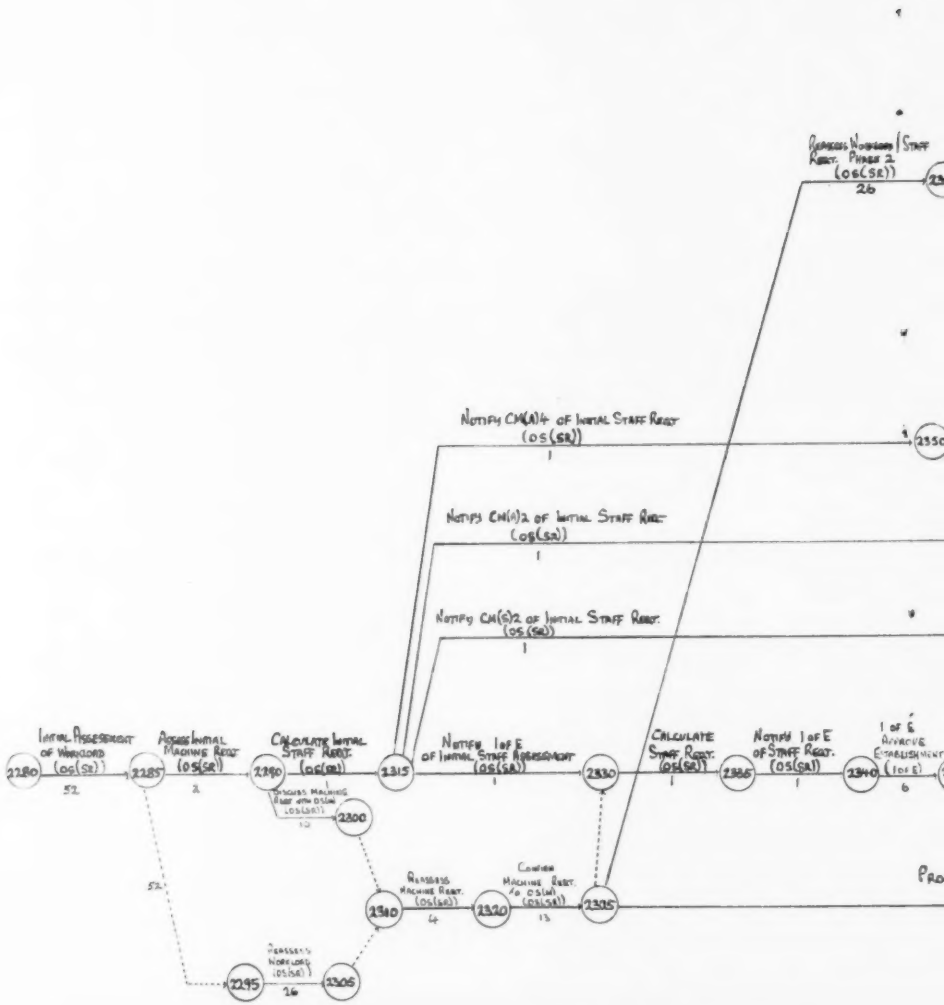
Drawing the network

Following the outline of the network, one member of the team produced draft detailed logic drawings for each main area of work in the network (in effect forming a sub-network although they were not designated as such). Following advice from the reprographic service the second member produced a fair copy on blue linen (for dyeline reproduction) at the same time checking on the network logic. The replies to the questionnaires were used as the basis from which to identify the detail from which the network could be evolved to cover the two separate building phases of construction. As the network was drawn each activity description, duration and division responsible for the activity was entered. Over a period of approximately three months the full network for dispersal was drawn—at this stage it was now some 41 feet long! It consisted of a master network with four major sub-networks—the sub-networks dealt with the PABX, telecommunications, computers and telex. Within the sub-networks a greater depth of detail was shown and, additionally, one division within MOD was designated as co-ordinating authority for action on the sub-networks.

Normally numbering of events for a network of this size follows the convention of top to bottom and left to right, but in our case it was decided to number each section separately, covering a main area of work individually, because of the extraordinary length of the drawing. A section of the network, covering Reprographic Services, is shown at *Figure 1* and the symbols used in the network diagram are shown at *Figure 2*. Because of the size of the drawing to have shown all dummy activities in the conventional symbols would have created the effect of 'Clapham Junction' multiplied many times over and the subsequent network diagram would have been indecipherable. Therefore, dummies between sections covering main areas of work were dispensed with as such and replaced by a flag surmounting a double circle event symbol. The direction of the dummy activity was shown by an arrow head on the 'flagstaff'. The flags were coded with an alpha key so that dependencies could be readily identified from a prepared list; in all there were initially 55 flag codes although these were later increased to 60.

Figure 1

CARDIFF DISPERSAL NETWORK – REPROGRAPHIC SERVICES



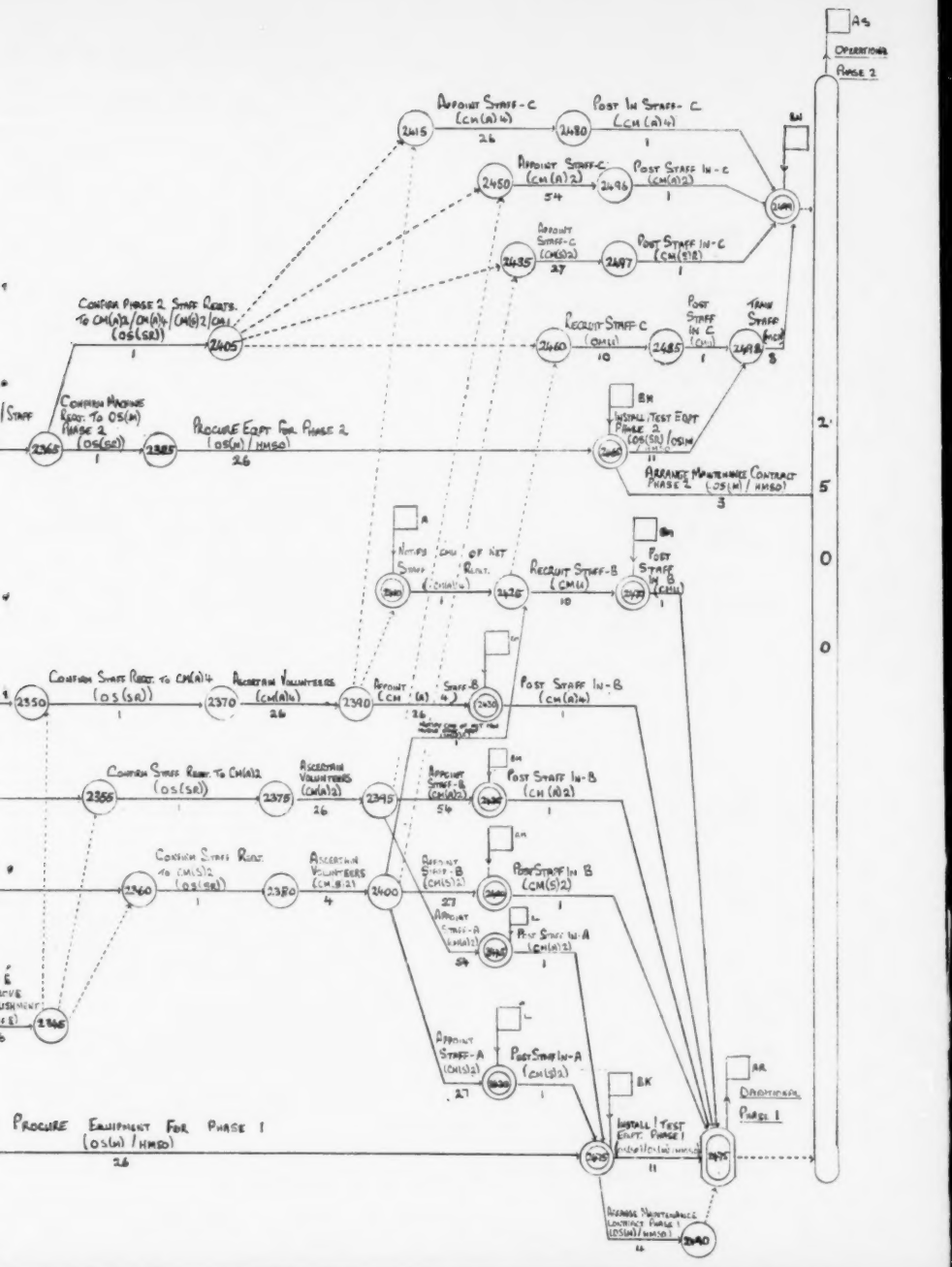

A5
OPERATIONAL PHASE 2
APPOINT STAFF-C (CM(A)4)
26
POST IN STAFF-C (CM(A)4)
1
2415
2480
APPOINT STAFF-C (CM(A)2)
54
POST STAFF IN-C (CM(A)2)
1
2450
2496
APPOINT STAFF-C (CM(S)2)
37
POST STAFF IN-C (CM(S)2)
1
2435
2497
CONFIRM PHASE 2 STAFF RECRTS. TO CM(A)2/CM(A)4/CM(S)2/CM1 (OS(SR))
1
2405
RECRUIT STAFF C (CM14)
10
2460
2485
POST STAFF IN C (CM1)
1
TRAIN STAFF (HCM)
5
2498
CONFIRM MACHINE REQTS. TO OS(M) PHASE 2 (OS(SR))
1
2365
2385
PROCURE EQPT FOR PHASE 2 (OS(M) / HMSO)
26
INSTALL/TEST EQPT PHASE 2 (OS(SR)/OS(M)/HMSO)
11
2480
ARRANGE MAINTENANCE CONTRACT PHASE 2 (OS(M)/HMSO)
3
2,500
NOTIFY CMH OF NET STAFF REQTS. (CM14)
1
2340
2425
RECRUIT STAFF-B (CM14)
10
2470
POST STAFF IN B (CM14)
1
CONFIRM STAFF REQTS. TO CM(A)4
(OS(SR))
1
2350
2370
ASCERTAIN VOLUNTEERS (CM(A)4)
26
2390
APPOINT (CM (A) 4) STAFF-B
26
2430
POST STAFF IN-B (CM(A)4)
1
CONFIRM STAFF REQT. TO CM(A)2
(OS(SR))
1
2355
2375
ASCERTAIN VOLUNTEERS (CM(A)2)
26
2395
APPOINT STAFF-B (CM(A)2)
54
2440
POST STAFF IN-B (CH (A)2)
1
CONFIRM STAFF REQT. TO CM(S)2
(OS(SR))
1
2360
2380
ASCERTAIN VOLUNTEERS (CM-S-2)
4
2400
APPOINT STAFF-B (CM(S)2)
27
2445
POST STAFF IN B (CM(S)2)
1
APPOINT STAFF-A (CM(A)2)
54
2340
POST STAFF IN-A (CM(A)2)
1
APPOINT STAFF-A (CM(S)2)
27
2330
POST STAFF IN-A (CM(S)2)
1
2346
PROCURE EQUIPMENT FOR PHASE 1 (OS(M) / HMSO)
26
INSTALL/TEST EQPT. PHASE 1 (OS(SR)/OS(M)/HMSO)
11
2435
2475
ARRANGE MAINTENANCE CONTRACT PHASE 1 (OS(M)/HMSO)
4
2340
ORDINARY PHASE 1

Figure 2

CARDIFF DISPERSAL NETWORK - EXPLANATION OF SYMBOLS

The symbols used in the network are as follows:

Activity arrows

A full line arrow which represents a time consuming activity. The title, or description of the activity is written above the arrow shaft with the branch(es)/ division (s) responsible for the activity immediately beneath the description. The duration of the activity is below the arrow shaft and is expressed in weeks.

An event circle

This represents a point of achievement. It consumes no time, it links activities thus maintaining the logic of the situation. Event circles are numbered so that activities can be described by their start and end events.

A double even circle identifies an interface either between events or between the main and sub-networks.

A dummy activity

This is merely a component of the network which is used for maintaining logic or the unique identification of activities. It does not consume time, it only denotes a dependency on the preceding event(s).

Out to succeeding event

In from preceding event

This also represents a dummy activity in the network and is used in lieu of the broken arrow where the dependency is out to or in from another page of the network diagram. The identification of the dependencies is written alongside each flag.

Event completion

This flag represents a target completion and is annotated accordingly.

Imposed date

This symbol denotes an imposed date. The symbol is inserted above the event concerned with the date written inside the symbol.An imposed date is the date on which management requires an activity either to start or finish and is determined by circumstances outside the logic of the network.

Conversion of network to computer

Although in the early stages it was assumed that all the various calculations of timings would be carried out manually and the network itself maintained manually, as the number of activities increased to above 450 (which is the maximum considered to be manageable manually) expert advice was sought on the facilities available for maintaining the network by a computer program. Although the ICL 1900 PERT program is held by the Department its use would have required the Project Officer in CM(D) to have become a computer expert as well as to have acquired a working knowledge of networks. The advantages offered by a computer are the speedy and accurate calculations (providing the logic is correct!) and the output of data in a format acceptable to the customer and at such frequency as the customer requires—in our case at quarterly intervals in these early stages. The solution recommended was to use a simple package (COMPERT) designed by a computer agency (Computerline Ltd.) based on the ICL 1900 PERT program, operated by the Project Officer from a remote terminal, and with the Central Computer Agency's blessing the contract for this was placed. This package provides all the facilities of PERT but the Project Officer needs only to know the manner in which the project data are coded, input and up-dated and how the computer file store is maintained. Costs can be minimized by electing to run overnight rather than during prime time (i.e. normal office hours).

For each activity on the network it was necessary to prepare an input document (multi-entry) containing the basic data, i.e. the preceding event number, the succeeding event number, activity description, duration time and the division responsible for the activity. The input documents were then converted to punched cards 'in-house' to minimize the bureau charges although coding and punching will be done by the bureau, at a cost, if required.

The next stage was to set up the main computer file which would be subsequently used to produce the computer output which management would use as a tool to control dispersal. The computer package takes you through various stages; we were concerned with 'Trial', 'Add' and 'Up-date'. The trial stage is used initially to prove that the data input to the computer represents the network drawing correctly and that there are no errors in logic or coding; it also automatically checks the data for validity. The common errors at this stage are 'start dangles', 'finish dangles' and 'network loops'. The start and finish dangles mean that an activity would appear to have no logical preceding or succeeding activity—more often than not this can be attributed to a coding error particularly in relating the sub-networks to the main network; a network loop identifies an error in the network where a chain of events chases round in a circle with the end event turning out to be the start event also! In our case, despite manual checks a few dangles and one loop got through because of the sheer size of the whole network.

Having corrected these errors, a further Trial run was undertaken to confirm the validity of the network. This was followed by an Add run which set up the proven network on the permanent computer file (known as the 'PERT data' file) and generated the first print-out. At this stage the network comprised 1,521 activities including some 600 dummy activities.

The first print-out

Following the first run the outputs were retained within the Management Services Division for analysis and evaluation to determine the extent to which detailed advice and instructions for users were necessary. This review showed that certain changes in the computer prints were required to meet our particular needs. This run was based on an open-ended project with only the start date specified which would have led to difficulties in identifying the causes of any slippage in the project completion date.

The next stage involved some instructional and 'sales' work by the Management Services team. The network diagram, or extracts of it if more appropriate, together with samples of the prints, were supplied and explained in detail individually to all the divisions involved in the dispersal exercise. They were subsequently to receive a full set of instructions giving a basic description of the network, full details of how it was to be maintained by computer and comprehensive explanations of the computer prints and how to use them.

As a result of discussions on the first run with the Project Officer and divisions the first refinement was built into the network. In this specific dates were imposed on certain events to limit their start or finish, such as, for example, completion of building at the dispersal site and indeed the overall target date for completing dispersal. Changes were also made to the format of certain print-outs. The first run in earnest took place at the end of June 1978 and the resultant print-outs, together with the comprehensive instruction, were issued to all the users by the Project Officer.

Types of print-outs

Although the program provides for analysis by time, manpower and material resources, only a time analysis of the dispersal network was required, showing the earliest and latest start and finish times for all activities. There is a wide and comprehensive range of reports available but for our project only the following were required:

(1) *All activities in preceding event/succeeding event sequence.* This print-out is a reference document which lists activities in preceding event/succeeding event sequence by main and sub-networks. It is used by the Project Officer as an index and in conjunction with the reports at (2) and (5) below.

(2) *Critical activities in total float order.* This print-out is also for the Project Officer's use and shows critical activities in total float order

including the critical path. A critical activity, in our case, is one for which there is no float available (i.e. no time additional to its own duration).

(3) *Critical activities by report code.* This print-out is identical to the one at (2) above except that it is sorted for distribution to and use by the divisions concerned with these activities.

(4) *Turn-round document* (and following experience with the first run a supplementary turn-round document for certain specified key events). This print-out shows the activities due to commence within a given period (our print-outs covered 30 months) and gives not only the earliest date on which activities may start but also the duration of the activities. The PERT program sorts the activities by divisions. The print-out is used by divisions to report progress on activities. Whilst the main turn-round document links the start of activities to the earliest start date, the supplementary turn-round document gives the latest start date for activities concerning all recruitment and appointment of staff. It is designed to prevent staff recruitment for the dispersed site taking place too soon.

(5) *All activities in total float, scheduled start, preceding event and succeeding event sequence.* This print-out is used by the Project Officer in conjunction with the information on the turn-round document to decide whether any delay in the start of an activity, or the extension of the duration time for an activity, can be permitted.

(6) *All activities in total float, scheduled start, preceding event and succeeding event sequence sorted by the report code.* This print-out is identical to the one at (5) above except that it is sorted for distribution to and use by divisions. It was an additional requirement following experience with the first run.

To summarize, the reports at (1), (2) and (5) above provide the Project Officer with the information which enables him to control the project and identify any activities behind schedule and by analysis where the trouble starts. Divisions report progress on their activities to the Project Officer on the 'turn-round document' and are alerted to any problems or prospective problems by the critical activities print-out at (3) above. The report at (6) above shows divisions all their activities with earliest and latest dates for starting and finishing them and also the float available.

Up-dating the network

While the users were coming to terms with the computer print-outs and relating them to the network diagram, as an 'after sales service' to CM(D) and as a 'proving' exercise the Management Services team completed an in-depth analysis of the network to see what flexibility there might be in the overall duration of the project and whether certain activities which had given rise to queries could be rephased.

A revised network diagram was now produced with a total of 1,643 activities, 60 action divisions and 47 main areas of work which would have necessitated more than 50 per cent of the PERT data file being amended. On the advice of the computer agency a new PERT data file was created as this was simpler and less liable to error than to attempt such a major amendment to the original file. The same steps had to be followed as for the first network but the experience gained the first time round meant fewer errors were made at the coding stage. The up-dated information provided by divisions in response to the June print-out was fed into the revised PERT data file. Provision was also made at this stage for the two additional print-outs already mentioned at (4) and (6) above for use by divisions concerned with dispersal.

The actual task of up-dating is itself not greatly time consuming. In ordinary circumstances and for normal purposes not more than about one half-day is needed to prepare the input document from the turn-round documents and from any other sources such as progress meetings. The terminal operation time is a matter of up to an hour's work, all things being equal.

Following this second quarterly run an analysis of the print-out was made to confirm that it met all needs and also to prove that it was simple to establish whether the planned program of events was being met and where problems or delays lay. A morning spent on this was sufficient to allow us to plot the critical path, identify the activities causing or likely to cause delay and to establish the division(s) it would be necessary to consult to recover the slippage. This was sufficient to prove that the system we had developed provided the simple and speedily operated tool necessary for close control of the project.

Managing the project

The COMPERT package provides action divisions with print-outs which tell them when they should be taking action, what critical activities fall in their area and how long they could delay taking action without affecting following activities or the project completion date.

Nevertheless the Project Officer must still exercise tight control over action divisions by using the information provided in the computer print-outs. He has to analyse critical activities to determine where the problems might arise and, if there is any slippage, where it has arisen and how it might be recovered. He must ensure that the start of any activity is not delayed by the action division without reference to him first, for even if there appears to be some leeway in a chain of events if it is taken up wholly by one activity those subsequent to it may then become critical and the target completion date may slip. Above all he must ensure that there is timely feedback from action divisions at all times on start and finish of activities, changes in duration, prospective delays, etc, so that the network diagram can be amended as necessary and the file on the computer can be kept up to date.

An essential feature of the network is the flexibility it allows in that

any aspect of dispersal plans can be changed and new features can be built in. Such areas as staff attitudes to dispersal and housing at the dispersed location are examples of elements which have not yet been incorporated into the network, but when further studies have been undertaken the option exists for them to be incorporated if necessary. Conversely elements can be deleted.

Conclusion

Our experience has proved the need for a member of the staff of the Project Officer to be closely involved with the preparation of the network and its transcription to the computer file, testing and foundation. Ideally he should also undergo the Civil Service College network course and broadly have some experience in a computer orientated environment, although this depends on the extent of continued support available from the Management Services team. Only in this way will the full benefit be realized of this form of management information and control system. There is no doubt in our minds that it provides the best, probably the only, means of managing MOD's large and difficult dispersal tasks. And if other dispersing departments wish to draw on our experience we will be only too pleased to give them the benefit of our hard-won, if still limited, knowledge.

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Readers may like to know that selections of articles which have appeared in *MSIG* are available from the Editor. Each selection covers a specific subject-area, for example:

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Flexible Working Hours in the Ministry of Defence

L. N. MUDDEMAN, Ministry of Defence

Len Muddeman is Departmental Liaison Officer for flexible working hours in the Ministry of Defence. —*Editor.*

Any new system which can be dismissed by a trade union official as being mainly in the interest of management and sniffed at by management as being largely Staff Side oriented must, I concluded, have its heart in the right place. Appointed Departmental Liaison Officer (DLO) for flexible working hours in the Ministry of Defence early in 1976, I was soon aware of the conflicting opinions about FWH, but now, with some 180 FWH schemes on the books to date, it is clear that the fears and misunderstandings about FWH which might have impeded its progress have long since given way to confidence in its working and to an appreciation of its benefits. FWH has come, has been seen and has conquered.

FWH schemes are based on the Code of Practice agreed between the Official and Staff Sides of the National Whitley Council after experiments in the Civil Service between 1972 and 1975 which involved close consultation between management and the Staff Side at all levels. The Code was issued in November 1975 and the intention was that the new arrangements should provide a more flexible system of attendance for staff covered by such schemes, and that this should be achieved without adverse effect on the overall efficiency of departments or on their service to the public.

It is probably fair to state that in units the pressure for FWH comes mainly, though certainly not wholly, from the Staff Side and that, though the advantages of FWH to the staff are obvious, the benefits to management are less immediately apparent but are appreciated as schemes settle down. There will, of course, always be extremists on both sides who will never be shifted from the view that if they accept FWH they are being sold a pup. But experience indicates that FWH is one of those measures from which both sides—if one must think in terms of the conventional tug-of-war—stand to gain.

The proposition, with which FWH starts, that within limits in most offices there is normally no reason why all the staff should arrive and leave together, is not new. What is new is that FWH has brought a realism into attendance arrangements and has systematized control

over what for years, particularly in large urban areas, tended to be uncontrollable. It makes 'honest' men and women of those who, whatever their nominal attendance system, have perforce been unable to sustain a regular pattern of attendance from day to day because of the realities of modern life. Peak-hour travel, transport delays, traffic jams, strikes, indeed the unpredictable demands of domestic life in our complex society, have all for years militated against the concept of precise, consistent attendance times. FWH not only brings order into this disorder. Within limits which are clearly defined and acceptable to management, it gives staff a new facility, deliberately to vary arrival and departure times for personal reasons, and to do so with candour and dignity. Under an FWH scheme a person no longer needs to ask permission to take a car to a garage, or a child to school, in the flexible periods of the day. If he wishes, for personal reasons, which are his business, to leave earlier of an evening he can do so without a sense of guilt. This recognition of the facts and stresses of modern life, and of the dignity and needs of the individual, subject to the overriding obligation to complete the prescribed number of hours of the accounting period and be present in core-time, sets FWH ahead of any other system of attendance. Paradoxically, this extension of choice for the individual under FWH, far from being achieved at the expense of management, has gone hand-in-hand with the introduction of precise attendance recording arrangements which are as fundamental to FWH as the flexibility provisions themselves.

A real boon to staff, particularly those on a modest leave scale, is the ability to build up credit hours which, with management permission, enable an individual to have one-and-a-half days' credit leave, in half or full days, per accounting period of four weeks. In not all Defence establishments is management, at least initially, able to accord the full one-and-a-half days but most staff on FWH enjoy this facility, although again in practice not all staff avail themselves of the full one-and-a-half days. Few staff incur the permitted debit of one-and-a-half days per accounting period. The main anxiety of managements, particularly in the early days of FWH, was lest the new flexibility would undermine efficiency and detract from the job being done when it had to be done. This was understandable but with hindsight we now know that most of the anxieties about FWH have not been realized. FWH has not led to loss of control, to a chaos of staff coming and going. Individuals on FWH, for example, do not fluctuate wildly in their arrival and departure times.

Most staff on FWH tend to work a pattern of time, dictated no doubt by domestic circumstances. Likewise at lunch-breaks, despite the right of staff under the Code of Practice to take up to two hours, most individuals tend to take a short break in order to build up the permitted credit hours. FWH, of course, for all the precision of its attendance recording methods which are so fundamental to FWH, does not relieve the supervisor of his traditional responsibility for controlling the volume

and quality of the work done. Flexibility in attendance can, however, help management in coping with an irregular pressure of work and indeed facilitate a reduction in overtime working. For the individual it can provide an opportunity to benefit from the quiet hours of the day when work is less subject to the interruption of the telephone and visitors. FWH indeed, as managements have reported, can lead to improved efficiency. With FWH absenteeism, in the form of lateness, unauthorized early departure, or a protracted lunch break, disappears. If in the flexible periods an individual comes in late or departs early he is, as it were, penalizing himself rather than his employer and the obligation to build up his hours by the end of the accounting period rests inescapably and directly on himself. More, perhaps, than any other system FWH in this sense is self-policing.

With flexible hours there is more incentive for individuals to complete a job by arriving early or staying late within the bandwidth (i.e. the limits within which the office is open for work) because they know that all time put in will be credited to them. Under the Code of Practice the bandwidth should be a minimum of 10 hours and a maximum of 11 hours, a typical bandwidth being 0800 hours to 1800 hours. One argument indeed for FWH is that it caters for the fact that constitutionally people vary and that some thrive on an early start, others operate best late in the day. This flexibility is itself an aid to the recruitment and retention of staff, especially of married women. Obviously there must be limits to the length of the working day, particularly as this involves heating and lighting, and that is why normally the 10-hour bandwidth applies.

In the early days of FWH in the Ministry of Defence there were certain murmurings against what some staff called 'clocking-in' and out. This was understandable and arose largely from a misconception of the object of time recording which was not to record arrival and departure times for the management but to record total hours as they accumulate and enable staff to see how these compare with the target hours. Without some system of recording time worked and identifying credit/debit hours at the end of the accounting period there could be no FWH scheme.

In the end none of the arguments about FWH is likely to be conclusive. What matters is the spirit in which management and staff approach the concept. Indeed, in the MOD schemes there is normally a paragraph which states:

> The introduction of FWH allows you greater freedom but places added responsibility on you as well. To make it work well you will find that you will have to give and take with your colleagues.

This is the heart of the matter, a plea for fairness and good sense in producing and working the scheme because FWH, like any agreement, will not work if designed to be exploited. Happily, the evidence is that

schemes based on the Code of Practice and balancing the interests of the Official and Staff Sides are working well, and that most individuals measure up to the increased responsibility implicit in an FWH scheme.

The fact has to be accepted that not every establishment and not every element in an establishment may be able to operate FWH. In MOD there are problems of production and team-work, of non-industrials closely supervising industrials, and of Service operational requirements, any of which may inhibit the working of FWH. Even so, it would be a rash DLO who tried to define the area in which FWH is or is not appropriate. FWH is essentially the art of the possible. What is unhelpful is if attitudes are taken up, prejudgements made about the possibility of FWH before the facts of the situation have been calmly and objectively examined. In MOD there is the widest variety of establishments, differing in size, function and composition, employing industrials, non-industrials and Servicemen. Each of them, be it a Royal Ordnance Factory, HM Dockyard, Central Ordnance Depot, R and D Establishment, REME Workshop, RAF Station, Pay Office, Manning and Record Office or small headquarters office, has its own problems, human as well as technical, and in each of them the feasibility of working FWH has to be independently assessed.

The fact, of course, that FWH may not be practicable throughout the whole of an establishment need not imply that it cannot be usefully introduced in limited areas. The Code of Practice specifically allows for FWH to be introduced 'on a full or modified basis for selected groups or grades'. A gradual approach to FWH through a pilot scheme is normal and enables confidence to grow and snags to be identified. Likewise, the fact that a particular section, say a registry, must be manned throughout the day need not necessarily exclude the staff employed there from FWH. Often it is possible in such circumstances to ensure that the section is so manned by having an official or unofficial roster, the effect of which might mean that for a part of the accounting period the staff concerned are tied to a certain time but for most of the period they can work FWH and enjoy its benefits, such as credit leave.

Before an FWH scheme is installed in a Defence establishment a number of processes have to be cleared, and although these take less time in some establishments than in others there are no short-cuts. Normally, the first step is to set up a small local Working Party of Official and Staff Side representatives to discuss the feasibility and details of a scheme. This is the stage at which the pros and cons of FWH must be considered, the real as distinct from the woolly objections stated, the means of ensuring that with FWH the job can still be done made clear. If, however, as is usually the case, an agreed draft scheme emerges from these discussions, this is sent to the DLO who in turn will clear it with the Departmental Staff Side (DSS), since under the Code of Practice 'any FWH scheme must be agreed with the local and departmental Staff Sides'. Once the scheme has been accepted at headquarters level the DLO, who is required to advise on the appropriate time recording

system, will put the unit in touch as necessary with the appropriate machine firm. The firm's representative then visits the unit, discusses the situation with them and provides the DLO with a quotation. The DLO is responsible for authorizing all purchases of equipment.

Most schemes in MOD are based on an Example of Operating Instructions given in the regulations since this example incorporates the provisions of the Code of Practice which was agreed at national level. In exceptional cases, if it is necessary to deviate from a particular provision of the Code, the deviation must be agreed between the Official and Staff Sides and the reason for it explained.

The DLO is charged with ensuring that FWH is installed economically and is required to advise in every scheme whether a manual or machine recording system is appropriate, and, if the latter, on the appropriate machine system. To a large extent the type of scheme depends on the number of staff who initially opt for FWH, the potential numbers (since once a scheme is installed others usually join who initially do not opt for FWH) and the location of the staff. Manual schemes are acceptable for small numbers, but generally machine recording equipment pays for itself in the reduction of paper work and administrative 'chores'. It provides the individual with a speedy and objective means of recording his attendance and provides management with readily accessible information about the position of staff. The most difficult situation to deal with is when staff are scattered in small numbers over a wide area. Ideally there should be a uniform recording system throughout the establishment, but in large units, where the groupings of staff vary, it is sometimes necessary to have a mixture of systems, an electronic and metering system, or even a manual, metering and electronic system. Though not ideal a compromise solution is probably better than to exclude certain groups of staff on the grounds that they cannot economically be included in the main system. Every scheme has to be assessed on its merits and it may be necessary to reconcile the factor of economy with the particular requirements and resources of the unit. Some units require a centralized machine system where the up-dating function is done centrally, and which provides a centralized print-out as a record of how the staff stand. Other units, which may not be able to provide the necessary centralized administrative backing, may opt for a decentralized machine system. Some units require attendance indicators. Others decentralize the control of attendance function to the immediate supervisor. In the rare event of a unit ceasing to need its FWH equipment, e.g. on disbandment, arrangements can be made by the DLO to transfer the equipment elsewhere.

Most establishments interested in FWH go through the various processes leading to the installation of a scheme with few real difficulties. Exceptionally, however, the debate about FWH between the Official and Staff Sides can drag on for months, even years—not always without acrimony and frustration. The arguments may be about technical mat-

ters, e.g. the length of the bandwidth or core-time, but usually, where there is protracted delay, the dispute is more fundamental—whether, for example, FWH is appropriate at all in the establishment. The DLO has neither the resources nor indeed the responsibility for arbitrating in disputes, but by virtue of his experience he is well placed to advise on points of interpretation of the Code, to dispel misunderstanding about FWH and to suggest possible courses. But beyond that he cannot go and if for reasons which are not always clear, and may owe as much to human frailty as technical objections, the end, or apparent end, of the road is reached, he can console himself about the arguments with the words of Edmund Burke:

> We have them in every shape; we have looked at them in every point of view. Invention is exhausted; reason is fatigued; experience has given judgement; but obstinacy is not yet conquered.

With about 180 schemes submitted to date, from units at home and overseas, both the Official and Staff Sides can take some pride in the progress made in installing FWH. Given the necessary administrative machinery which had to be established in MOD, the main burden of hammering out schemes, of reconciling the requirements of the job with the reasonable aspirations of the staff, has fallen on the representatives at local level, and without their good sense and moderation FWH would not have got very far. No scheme is an accidental phenomenon. It is the product of careful analysis of the unit tasks, goodwill and a sense of the possible. Prejudice and generalizations really have no role here.

It is too early to assess whether we are getting over the hump of demand for FWH in MOD. FWH thrives on example, and so long as there are large numbers of non-industrial staff for whom FWH might be feasible, new or extended schemes can be expected. The success of FWH rests on the maintenance of a balance of interest between the Official and Staff Sides. The former must be assured that with FWH the work which is required to be done will still be done at the time it is required to be done. The Staff Side, accepting the need to record attendance hours, must be satisfied that they are not being unreasonably denied the full benefits of FWH. All in all, an FWH scheme is as good an exercise in co-operation as may be found.

The Management Implications of the Structured Design Method

I. R. JARVIS, Civil Service Department

Ian Jarvis is Head of the Systems Design and Programming Techniques Section of the Technical Services Division (C3) of the Central Computer Agency (CCA). The article that follows is a personal view and does not represent CCA policy, although CCA is interested in the Chief Programmer Team organization. The author would welcome comment and discussion on the views expressed. —*Editor.*

Introduction

The idea of a Chief Programmer Team (CPT) organization as a management strategy within the computing sections of government departments has long been discussed. An article by Derrick Croisdale in the August 1977 edition of this journal* referred to the organizational structure for programming in the Civil Service and compared it with the CPT organization. The article that follows will explore a strategy for introducing team organizations to government computing.

Current organization of computing work varies but is generally along the lines suggested by Derrick Croisdale and based on a particular 'project'. Within this framework there are two types of person (or role): analyst and programmer. Traditionally analysts are mainly SEO with some HEO assistance while programmers are mainly EO with some HEO control. The division of work between the two skills is often blurred with many analysts doing systems and program design work, whilst some programmers write their own program specifications. Usual career progression is from EO programmer to HEO analyst/programmer and SEO analyst, which suggests that the role of analyst is considered more important than that of programmer.

Why, you may ask, should we seek to change this or challenge its effectiveness? It has at least four strengths:

(1) It works.
(2) It gives staff a group identity.
(3) It develops specialism.
(4) It promotes good user liaison.

In his article Derrick Croisdale suggested that substantial increases in

* 'Data Processing Professionalism—A Must or a Myth?' by D. W. Croisdale, *MSIG*, Volume 32, Number 3, August 1977.

programmer productivity (and therefore a reduction of costs) could be gained by a reorganization to Chief Programmer Teams, and additionally there would be better development of programming skills. If we look further at the conventional organization it is easy to find the following significant failings:

(*a*) There is a lack of standardization across projects.
(*b*) There is poor documentation (because of timescale deadlines); which leads to stagnation of staff (because knowledge is kept in heads); and inflexibility of priorities (because staff cannot move).
(*c*) Design is done at the coding stage.
(*d*) There is no career structure for a 'programmer'.

Should we not be looking for something that will keep the four strengths whilst eliminating the weaknesses and preferably that can take the current organization as a natural starting point?

Effects of the Structured Design Method

The Structured Design Method (SDM) is a method of designing computer programs that has been recommended by the CCA for some years. It is based on the premise that any data can be described using three well-defined rules and that the best program to process that data will be a direct representation of that description. This means that designing a program will consist of several tasks that can be grouped loosely as:

(*a*) Define and describe the data.
(*b*) Develop the program from this description.
(*c*) Write the program in the chosen computer language.

Details of the method can be found in *Central Government Code of Practice*, Number 18.

The use of SDM is closely related to the problems of organization because it does not always fit neatly into current strategies. With modular programming a Senior Programmer could quickly divide a program into a number of functional modules, often dependent upon the number of programmers in the team; thus all members of the team could start working at the same time. With SDM this division cannot be made until much of the design work has been done.

Secondly, experience has shown that SDM has brought about an easier interchangeability of staff. A programmer can take over the development of a program or perform an amendment to it without previous detailed knowledge. This can remove the necessity of having people designated to the maintenance of specific programs and perhaps eventually of having 'maintenance' teams altogether.

Finally, SDM has allowed a greater emphasis to be placed on the split between analysis and programming. At present an 'Analyst' is often placed as a project leader with responsibility for user liaison, system progress, analysis, design, control of programmers, operations

liaison, production of user and operations manuals and adherence to standards. A need can now be seen for three tasks: analysis, systems design and implementation (program design).

Initial team organization

The following strategy represents a proposal for the introduction of both SDM and Team organization into government ADP. The ultimate aim is a CPT organization but the strategy allows a gradual change with the possibility of temporary (or permanent) halts to allow each change to settle down.

The first step, once the decision to adopt SDM as a standard has been taken, is to set up a pilot project to allow a nucleus of staff to gain experience in the practical application of the method. Note that this project should *not* be used to evaluate the method. This project should cause the 'structured walkthrough' to be adopted fairly naturally as all members of the team will be learning and will help each other. The structured walkthrough is a particular type of team meeting where design work on a system or program is assessed by members of the team. The designer(s) will take the design and explain it to the others, i.e. walk it through, justifying their decisions. Any errors or inconsistencies will become clear very early in the design process.

Once sufficient experience has been gained by the programmers two types of *pool* should be set up: an analyst pool and a programmer pool (see *Figure 1*). These pools will be for trained SDM personnel and initially there will be one of each. Training for the pool of analysts

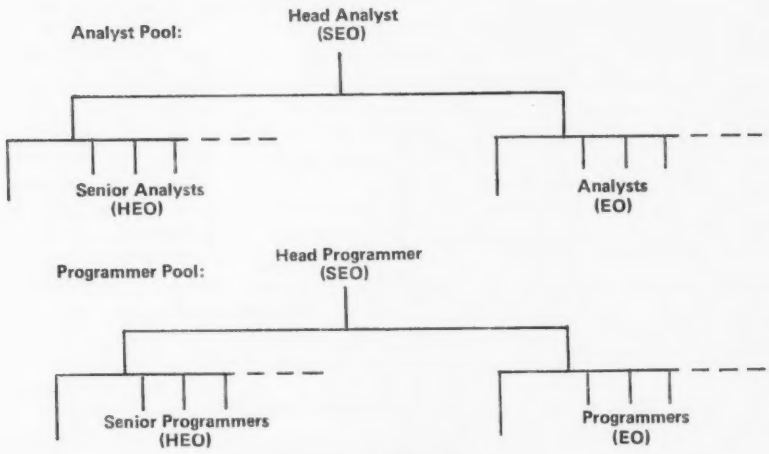


Figure 1

should be done whilst the pilot project is proceeding. The analyst pool will be led by an SEO 'Head Analyst' and will have several HEO 'Senior Analysts' and EO 'Analysts'. The programmer pool will be led by an SEO 'Head Programmer' and will have several HEO 'Senior Programmers' and EO 'Programmers'.

When a project is conceived an *Implementation Team* will be formed. This team will vary in size and complement through the various stages of the project's life. Initially a project will have an analyst assigned as the Chief Analyst for the Implementation Team. The grade of the Chief Analyst could be any of the three mentioned depending on the size and complexity of the project. During analysis other analysts may need to be allocated to the project to assist the Chief Analyst. After analysis is complete a programmer will be assigned as the Chief Programmer to the Implementation Team. Again the actual grade could be any and would normally be the same level as the analyst already assigned. At this stage it is likely that some of the additional analyst staff could be withdrawn and assigned to another project.

The Chief Analyst and Chief Programmer will work together on the systems design. Then the Chief Programmer, with other programmers ar necessary, will complete the program design work and eventual psogramming. The Chief Analyst will still be needed though in a reduced capacity. He will be responsible for only co-ordination, user liaison and ensuring that the programs designed meet the needs of the systems specification. He will attend all walkthroughs relevant to the achievement of these aims.

Thus the dynamic structure of a pair of pools and an Implementation Team at the height of activity on a project could be as in *Figure 2*.

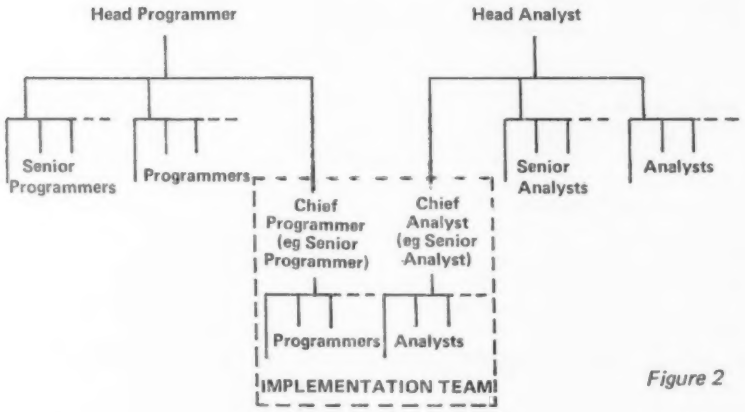


Figure 2

Any number of Implementation Teams will be continuously forming and disbanding. Flexibility is the main criterion and each team will only be as big as necessary to do a specific job. Thus 'Chief Programmer' describes a *role* in a team and not a particular grade.

As part of the adoption of SDM a decision will have to be taken on the criteria under which SDM (and therefore the pools) will be used. For those computing sections with little or no maintenance this will be simply 'all new work'. However, for the majority of sections with heavy maintenance loads this would represent a very small percentage of their work. A strategy for maintenance tasks, such as, 'if more than one-third of the modules in a program need changing, then re-design the complete program using SDM', will have to be adopted so that the complete workload will gradually move over to SDM.

Growth of the new organization

As SDM work increases, the number of pools and their staff will need to be increased. Careful planning of the training of both analysts and programmers will be needed. This will lead to an expansion of the new organization and complementary reduction of the old, and will simultaneously develop the type of staff needed for the Chief Programmer role in an Implementation Team. As a corollary there should eventually be no need for a maintenance team of any sort. Any change, however occasioned, will be treated as a new project and allocated staff accordingly.

The work of the section will need to be divided up between the pools and this can be done in one of two ways. Either any job will be allocated to any pool with spare resources or each pool, or group of pools, will be limited to a particular area of specialism, e.g. financial systems. This latter could help user liaison.

Responsibilities will need to be clearly defined for each role. Pool heads will be responsible for standards and techniques used and the control of pool staff. The Chief Analyst (of an Implementation Team) will be responsible for the problem analysis, the co-ordination of development (including system testing) and user liaison. The Chief Programmer (of an Implementation Team) will be responsible for all program design and writing. There will be joint responsibility for systems design and production of user and operations manuals.

Some computing sections may feel that there is a need for a pool of Project Leaders (possibly at the same level, SEO, as the pool heads). This could fit in with the described system with the project leader taking overall responsibility for a project and for its development. This would be particularly relevant where one project was sufficiently large to need several Implementation Teams (as one project leader could probably handle several Teams).

It could be suggested that there will be problems with staff reporting; this need not be so. Any person designated to complete a report on a staff member would have to consult others for whom the officer had

worked. This 'group' approach could lead to much greater consistency and fairness in staff reporting.

Chief Programmer Teams

Experience will grow and confidence in team working will allow each pool to become smaller and new pools be set up as bona fide Chief Programmer Teams. The HEO senior programmers will quickly become sufficiently experienced to take on the full role of Chief Programmer. The basic team will consist of:

Chief Programmer (SEO)
Back-up Programmer (HEO)
Programmers (2–4) (EO)

The back-up programmer will be a less experienced senior programmer who will be expected to fill a Chief Programmer post in the future.

One must not ignore the role of Librarian. This job entails supporting a team in all clerical matters, keeping records and documentation and submitting jobs to the computer. The type of person suitable for this job is not really known. It has been suggested that high quality COs are needed, but this must be disqualified because any system must work with ordinary staff. An answer may be a further pool of librarians (one librarian may be able to handle several teams) who would be able to build up their own special expertise.

Summary

The proposed strategy fulfils the aims of the final sentence of the Introduction. Additionally it has further benefits:

(1) It starts from a common point.
(2) It uses familiar ideas (pools).
(3) Each change is small.
(4) Rate of change can be controlled by each department to suit its own conditions.
(5) It provides for a gradual development of Chief Programmer.
(6) Computing sections can stop at any point.

Management Services handbooks

Readers may like to be reminded of the titles that are available in the Management Services Handbook series, published by CSD Management Services. They are:

E.125 *Typing services* (44 pages, price 50p)
E.130 *Forms control* (38 pages, price 65p)
E.132 *Centralized dictation systems* (25 pages, price £1·15)
E.133 *Transport management* (32 pages, price 60p)
E.134 *Microcopying systems* (55 pages, price £1·35)
E.136 *Management accounting in the Civil Service* (76 pages, price £1·15)
E.137 *Glossary of accounting terms* (28 pages) (Not available outside United Kingdom)
E.142 *Storekeeping and storehouse management* (62 pages, price £1·15)

Departments may obtain copies from Her Majesty's Stationery Office through their normal departmental publications demand channels. Persons and organizations outside the Civil Service may obtain copies from The Librarian, Central Management Library, Civil Service Department, Room 1/1, Old Admiralty Building, Whitehall, London SW1A 2AZ. Orders must be accompanied by a cheque or postal order, made payable to 'Civil Service Department'. The prices quoted above include postage (within UK) for a single copy.

Management Consultants in Government

We have from time to time published lists of management consultancy assignments commissioned by government departments. The last such list, covering the calendar year 1977, appeared in the February 1978 edition of MANAGEMENT SERVICES IN GOVERNMENT.

A list of such assignments commissioned during the calendar year 1978 now follows. The list excludes:

(*a*) Computer consultancy (including assistance with computer systems and programming).

(*b*) The employment of consulting staff, whether on secondment from their firms or not, to augment departmental teams.

Advice to departments on the use of management consultants is given in *Code of Practice for the Use of Management Consultants by Government Departments*, copies of which may be obtained from Her Majesty's Stationery Office (price 31p to persons and organizations outside the Civil Service).

Department	*Nature of assignment*	*Consultant used*
Civil Service Department	Job satisfaction studies	Imitax Ltd.
	An operational research study on behalf of the Royal Commission on Criminal Procedure	Orcon Services Ltd.
	A second operational research study on behalf of the Royal Commission on Criminal Procedure	Cranfield Institute of Technology
Defence, Ministry of (including Procurement Executive and Royal Ordnance Factories)	To devise a management system for monitoring the development of a round of ammunition	Arthur Young Management Services
	To devise an incentive scheme at ROF Cardiff	H. B. Maynard & Co. Ltd.
	A materials handling system study at the Central Ordnance Depot, Donnington—Phase 1	Modern Materials Management Ltd.
	Feasibility study of a work measured incentive scheme at ROF Bridgwater	PA Management Consultants Ltd.
Environment, Department of the ..	To assist the Serpell Committee review of Ordnance Survey	Arthur Andersen & Co.
	Review of Property Services Agency (Supplies) commercial fleet	National Carriers Ltd.
Health and Social Security, Department of	Feasibility study of patient progress in breast cancer	Metasa Ltd.
	To produce a written planning methodology describing an approach to strategic planning for Area Health Authorities	Logica Ltd.
	Field study of the Lambeth, Southwark and Lewisham Area Health Authorities	Inbucon Ltd.
	Study of the nurse manpower system in the South West Thames Regional Health Authority	Institute of Manpower Studies
	Study of the manpower system in Guy's Health District	Institute of Manpower Studies
	Participative management in the Cleveland Ambulance Service	Productivity & Management Services Ltd.
Home Office	To identify six plastics products for bone craven injection moulding machines in Prison Industries	Inbucon Ltd.
Industry, Department of	To write books on materials handling for managers in industry and on a systems approach to materials handling	William Hesketh (Associates) Ltd.

Department	*Nature of assignment*	*Consultant used*
Industry, Department of (*contd.*) ..	To write text of booklet on job responsibilities in materials handling	Industrial Training Service
	Study of markets for ships' disposable equipment	Environmental Resources Ltd.
	Study of potential market for a gear grinding machine tool	P-E Consulting Group Ltd.
	Study of the food processing equipment industry	PA Management Consultants Ltd.
	Feasibility study of proposed merchandise mart at Surrey Docks	Coopers & Lybrand Associates Ltd.
	Study of computer distributed database technology	PA Management Consultants Ltd.
	To advise on development of industrial research by industrial research establishments	Arrol Management Consultants Ltd.
	Study of world market opportunities for the British and French computer peripherals industries	Mackintosh Consultants Co. Ltd.
	Study of costs of beverage distribution and development of a model for cost comparison	Cranfield Institute of Technology
	Study of opportunities for British industry in development and marketing of marine pollution sensors	General Technology Systems Ltd.
	Study of cost of waste-paper collection, supply and use	Touche Ross & Co.
	Assistance with microprocessors awareness programme	PA Management Consultants Ltd.
	Study of export market prospects for wind turbine generators	Electrical Research Association
	Study of future development of a United Kingdom tin mine	RTZ Consultants Ltd.
Lord Chancellor's Department ..	Study of computer audit in magistrates' courts	Arthur Andersen & Co.
Manpower Services Commission (including Employment Service and Training Services Divisions) ..	Study of unit costs within the 'Capital' system of vacancy circulation in North East London employment offices	Cooper & Lybrand Associates Ltd.
	Further work on the special programmes for the unemployed	PA Management Consultants Ltd.

Department	*Nature of assignment*	*Consultant used*
Manpower Services Commission (*contd.*)	A local labour market study	Metra Consulting Group Ltd.
	Survey of training information needs (excluding TSD staff)	Industrial Facts & Forecasting Ltd.
	Survey of training needs in the ports industry	Industrial Training Service
	Survey of training needs in the Stoke-on-Trent area	Metra Oxford Consultants Ltd.
	Feasibility study on the cost and benefits of industrial training	Peat, Marwick, Mitchell & Co.
	Survey into training office staff for overseas trade	P-E Consulting Group Ltd.
	Survey of the training needs of accounting technicians	Research Bureau Ltd.
	Assessing criteria for the evaluation of the Directorate of Training, TSD	Inbucon Ltd.
Stationery Office, Her Majesty's ..	Feasibility study of an incentive bonus scheme at the Government printing works at Gateshead	Inbucon Ltd.
Trade, Department of	Study of effectiveness of European Components Service	Marplan Ltd.
Transport, Department of	Further work on the Port of London Authority study	Price Waterhouse Associates

Management Bookshelf

Indexes and Abstracts on Management Topics

K. G. B. BAKEWELL and Mrs. B. M. HOWARD

Introduction

Today there are so many journals published that no manager can hope to scan all of them—no matter how many quicker reading courses he has completed. The wise man will not attempt to keep up with the flood of writings but will confine his attention to abstracting and indexing services, thus putting on to the expert the task of sifting out for him the items that he really needs to read.

Indexing services

A notable indexing service is *Business Periodicals Index*, published monthly with regular cumulations by the H. W. Wilson Company of New York (subscription rates on application to the publisher); it does, however, have a definite US bias in its coverage. A more recent arrival is *SCIMP: Selective Co-operative Index of Management Periodicals*, compiled by the libraries of 10 European business schools, produced with the aid of a computer, published 10 times a year and distributed by the Manchester Business School (£30·00 per annum).

Indexes like these will help the reader to locate material on, say, Organization Development fairly easily, but they will not evaluate it nor give details of the manner in which the topic is treated. (He will have to go to the original sources to find out whether the articles meet his needs, and this may be time-consuming and expensive.)

Abstracting services

The manager will probably find an abstracting service rather more useful to him than an indexing service. These will summarize the main points of an article, as well as giving details of its source. They are often arranged under broad classified headings and are sometimes of a convenient format for scanning as a current awareness facility, as well as being valuable as a back record of past publications.

Among the abstracting journals of interest to the personnel management expert are two US publications. *Personnel Management Abstracts* is published quarterly by the University of Michigan Graduate School of Business Administration, price £23·00 a year; this lists with brief annotations all the articles from a number of academic and trade journals, the more important items in which are described in greater

detail. There are indexes to authors, titles and subjects. Particularly useful for the manager in the public sector is *Personnel Literature*, published monthly by the US Government Printing Office (price £12·00 a year), which contains abstracts of books, pamphlets, articles and dissertations received in the library of the US Civil Service Commission. As might be expected, this bulletin pays particular attention to publications bearing on the administration of the public service, both local and national. It is arranged in subject groups; each item is accorded a number of additional descriptors which together define its topic and its treatment with some precision.

The management services practitioner interested in the uses of automatic data processing will probably already be familiar with the weekly *Computing Journal Abstracts*, issued by the National Computing Centre. The abstracts are arranged in classified order, printed on one side of the sheet only, thus facilitating their extraction and filing as a personal index. This bulletin is but one part of an information service on computing topics which is available from the NCC, mainly free of charge to their members. An international classified abstracts journal on ADP, *New Literature on Automation*, is published by the Netherlands Centre for Informatics, price £40·00 a year. This is issued 11 times per annum and contains monthly and cumulated indexes. The abstracts, written by documentation experts in a number of European countries, are fully descriptive of the items cited. Another source of information, particularly geared to the needs of the professional, is *Computer Abstracts*, issued monthly by the Technical Information Company, St. Helier, Jersey, British Channel Islands, price £45·00 a year. This details: articles and papers in periodicals, conference proceedings, etc; US Government reports; patents and books. The first three types are arranged in the above order within each classified section of the bulletin; book abstracts appear in a final section. Also very well known are INSPEC's *Computer and Control Abstracts* which as well as being published in journal format are available for consultation on-line. The printed version costs £120·00 a year and is published monthly.

The operational research professional will be familiar with the quarterly *International Abstracts in Operations Research*, issued by the North-Holland Publishing Company (price £72·00 a year). A panel of international reviewers screen the specialist Press for current papers which make significant contributions to the science; the abstracts are (as far as possible) the authors' own summaries of their articles. Each of the four constituent parts of an annual volume contain a cumulating index of topics.

One helpful abstracting journal for the British manager is the series issued under the 'blanket' title: Anbar Management Publications. There are five bulletins in the series and each of them is sponsored by a leading professional organization in the field: *Accounting and Data Processing Abstracts* (sponsored by the Institute of Chartered Accountants in England and Wales); *Marketing and Distribution Abstracts* (the Institute

of Marketing); *Personnel and Training Abstracts* (the Institute of Personnel Management); *Top Management Abstracts* (British Institute of Management); and *Work Study and O & M Abstracts* (Institute of Management Services).

There are eight issues a year of each Anbar journal, published at approximately six-weekly intervals. Each issue contains something like 100 abstracts selected from the 225 journals covered by the service. No attempt is made to include all the articles in any journal: to qualify for inclusion, an item must (in the opinion of the specialist abstractor) make a definite contribution to the subject; if it is in a foreign language, it must not duplicate articles available in English. This policy of selectivity rather than comprehensiveness has occasionally been criticized but many regard it as one of Anbar's strengths.

There are two kinds of follow-up service available. The 'standard' service provides eight issues of each journal ordered, together with a binder and the annual index. The publishers will help subscribers to obtain photocopies of original articles, or will provide a licensed copy for a small fee. Translations of foreign language articles will be made available for an additional fee. The 'comprehensive' service, which costs rather more, provides two additional features: the 'Tear Sheet Library', which makes original articles available on 36-hour loan, and the 'Telex References Retrieval Service', which will identify articles on specific (or combinations of several) topics.

The Anbar pricing structure is somewhat complex and varies according to the number of journals ordered and the follow-up service desired. Full details (and specimen copies) can be obtained from Anbar Publications Ltd, P.O. Box 23, Wembley, HA9 8DJ.

On-line services

Finally a word about the computer. Some management indexes are now available on-line. This is particularly useful for retrospective searching, especially when the services of a professional information worker can be called upon, but it will be a long time before computerized data bases supersede the printed word. After all, you can't read a computer terminal on the train!

New CSD Publications

This is a list of the documents recently issued by the Civil Service Department and its associated bodies. It includes material from the Civil Service College and the Civil Service Commission, as well as from CSD itself.

These items may be examined in the Central Management Library, Civil Service Department, Old Admiralty Building, Whitehall, London SW1A 2AZ.

Unless otherwise stated, requests for copies should be sent to the Central Management Library, CSD, at the above address. HMSO publications may be ordered from PO Box 569, London SE1 9NH; from Government Bookshops, or through any bookseller.

Application of Race Relations Policy in the Civil Service
275 pages; available from HMSO; price £5·00.

Audio, Shorthand and Typewriting Tests: Hints to candidates
27 pages; available from HMSO; price £1·00.

Civil Service Selection Board: A reading list
19 references; gratis.

The Civil Service Year Book: Abridged and up-dated edition mid-1978
131 pages; to be published annually; available from HMSO; price £2·00.

Committee of Enquiry into the Engineering Profession (the Finneston Committee): Co-ordinated evidence of departments employing engineers in the Civil Service
21 pages; gratis.

Departmental Training Officers' Handbook
45 pages; gratis.

A Directory of Paid Public Appointments made by Ministers 1978
114 pages; available from HMSO; price £2·25.

Going on the Air
12 pages; price £0·30.

Home Civil Service: Senior Staff Movements
2 pages; published monthly; gratis.

Job Satisfaction Project Report: Civilian Pay and Records Office (Bath)
June 1975–January 1977
43 pages; gratis.

The Management of Health and Safety at Work: A reading list
46 references; gratis.

The Principal Civil Service Pension Scheme (Amendment) Scheme 1978
37 pages; available from HMSO; price £0·90.

Report of the Administration Trainee Review Committee
182 pages; price £1·50.

Associated papers available in microfiche format only; gratis to purchasers of the Report.

Self-instruction Newsletter
Number one, Autumn 1978; gratis.

Storekeeping and Storehouse Management: A Management Services Handbook
62 pages; available to government departments from HMSO-SD as General Service Form E142; available outside government from Central Management Library, CSD, at £1·15, including postage.

Civil Service College

A Short Account of the Administrative Processes which Led to the Setting-up of the Civil Service College, by P. D. Linley. (CSC Working Paper number 3) Available from The Librarian, Civil Service College, Sunningdale Park, Ascot, Berks SL5 0QE; gratis.

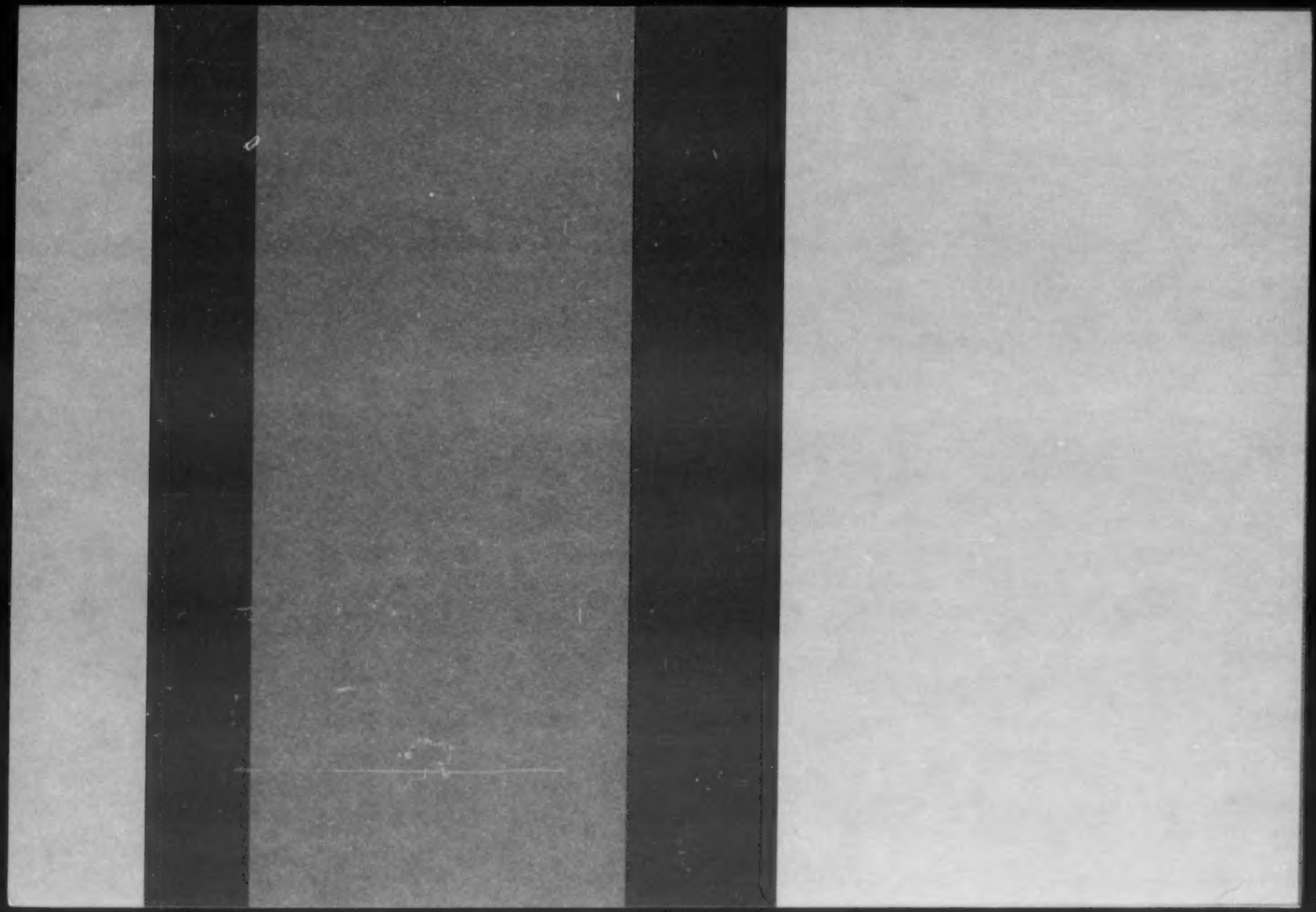
Civil Service Commission

Films and Video Cassettes: Civil Service Commission Careers Information
8 pages; available from Careers Information Division, Civil Service Commission, Alencon Link, Basingstoke, Hants RG21 1JB; gratis.

Computer Installations for Government Departments

A list of all Government computers as at 1st January 1978 was published as a supplement to the May 1978 edition. Details of computers ordered during the period 1st July to 30th September 1978 are shown in the following table.

DATE OF ORDER	DEPARTMENT[1]	LOCATION	MAIN USES	MANUFACTURER[2] AND TYPE OF COMPUTER
1B Computers on order for administrative and general purposes				
August 1978	DHSS	Newcastle	Contribution records	2× ICL 2980
September 1978	Manpower Services Commission	London	Accounts and simulation	CMC Reality/Royale 6310
2B Computers on order for scientific and technical purposes				
July 1978	MOD (PE)	Farnborough	Analytical work	Prime 400
July 1978	MOD (PE)	Farnborough	Graphics display	Tektronix 4051
July 1978	MOD (PE)	Fort Halstead	Scientific computing	Logica turnkey system
July 1978	Home Office	Sandridge	General scientific computing	Ferranti Argus 700
August 1978	MOD (Army)	Shrivenham	Research	DEC PDP 11/60
September 1978	MOD (PE)	Farnborough	Software research	Prime 300
September 1978	Home Office	Birmingham	Controlling laboratory equipment	DEC PDP 11/03

[1, 2] Refer to supplement to May edition for Department and Manufacturer keys. Abbreviation for the following manufacturer is included for the first time: Logica—Logica Limited.

Printed in England for Her Majesty's Stationery Office by The Campfield Press, St. Albans